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The Gold Resources
AND THE
Gold Mining Industry
of the
Far Eastern Republic

Soviet eastern industry



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CHAPTER I. INTRODUCTION

Russia occupied the fourth place among the nations in gold production, its annual production of gold being from fifty-five to sixty millions of rubles. The provinces of Eastern Siberia which now have become part of the Far Eastern Republic used to produce 33% of the entire gold production of Russia. The number of workers engaged in the gold mining industry in these provinces were 40% of the entire number of workers engaged in the gold mining industry of Russia. Most of the work was done by manual labor, and only in a few places were mechanical methods in mining gold used.

It is difficult to obtain the exact figures of the gold produced, as only a part of the total production was registered. The rest of the gold is not accounted for because, as for instance in the Amur province, a great deal of gold was smuggled into China across the Amur River by Chinese who are either mining gold independently or are employed as laborers in the gold mines. Russians also smuggled gold across the frontier.

At the Convention of the owners of gold mines of the Amur and Bureya district (in the Amur Province) the following figures were presented, showing the quantity of gold refined in the gold assay laboratories of the Amur Province during the period 1903-1916:

Years	Quantity (lbs.)	
1903.....	20,808	1910..... 43,812
1904.....	19,620	1911..... 42,948
1905.....	17,316	1912..... 42,768
1906.....	18,756	1913..... 40,932
1907.....	26,496	1914..... 43,596
1908.....	32,688	1915..... 26,424
1909.....	38,196	1916..... 16,128

Even these incomplete figures of gold mined in but one province undoubtedly show that the gold resources of the Far Eastern Republic are very large.

The following table shows the number of enterprises engaged in gold mining, and the extent of their production in 1913:

Mining Districts in Far Eastern Republic	No. of Co.'s	No. of Mines			Area of Mines in Acres			Number of Workmen
		Worked	Idle	Total	Worked	Idle	Total	
West Transbaikal	65	124	289	413	29,014.2	64,511.1	93,525.3	3,387
East Transbaikal	37	79	178	257	24,621.3	39,673.8	64,295.1	4,456
Amur	31	64	102	166	19,404.9	19,485.9	38,890.8	5,431
Zeya	65	168	397	565	54,774.9	100,191.6	154,966.5	8,977
Bureya	33	90	119	209	32,883.3	29,054.7	61,938.0	6,847
Mari-time	22	48	182	230	16,920.9	50,063.4	66,984.3	3,306
Ussury	4	5	60	65	1,193.4	14,126.4	15,319.8	391
Nerchinsk	1	10	....	10	.....	.....	.....	2,640
Total in Far Eastern Republic	258	588	3,327	1,915	178,812.9	317,106.9	495,919.8	35,435
Total in the whole of Eastern Siberia	415	901	3,495	4,396	246,402.0	767,453.4	1,013,855.4	51,114
Total in the whole of Russia	702	1,751	7,208	8,959	432,372.6	1,327,584.6	1,759,957.2	88,608

Regarding the gold resources in Russia in general and the territory at present occupied by the Far Eastern Republic in particular, we have a fully competent statement of a Special Committee convoked in 1911 at the Petrograd Advisory Office of owners of gold and platinum mines, as well as a report made by the Mining Engineer, E. E. Anhert, a well known authority on geological gold researches.

With reference to the gold mining districts in the Far Eastern Republic, the statement of the above Committee is, in general, as follows:

The data derived from geological and other researches enables us to state that our deposits contain many tens of thou-

* One pood—36.11 pounds.

sands of poods* of gold. For many years to come our gold mining industry will be assured of sufficient stocks of bullion, not mentioning the probability of discoveries of new deposits in vast and non-investigated territories, in particular, the Maritime, Amur and Nerchinsk districts. Similar deductions have been made by the foreign engineers, mainly American and British.

Consequently, there is a basis for the development of the gold industry, viz., the resources, it being only necessary to improve the mechanical methods and to secure a sufficient influx of foreign capital.

In particular, with reference to the Amur and Maritime Provinces, the Committee stated that there is in these provinces a gold-mining deposit, the length of which is about 700 miles and the width several hundred miles. This vast area has been very little investigated by the geologists, practically no researches having been made. From theoretical conjectures, there is reason to believe that considerable gold resources are here.

It is the opinion of this Committee that the greatest possibilities for the development of the gold industry in Eastern Siberia and the Baikal regions are in the Amur province, and in the territory of the Nerchinsk mining district (which formerly was the property of the Imperial Crown Lands), and that later, when mechanical methods of gold mining are applied, the Bargusin, Lower Amur, Maritime and Ussury districts will produce a great deal of gold. Almost no researches have been made at the Uda, Shantara and Sakhalien districts. According to data on hand, these districts are also of great interest as far as gold industry is concerned.

Engineer Anhert draws the following conclusions regarding Russia's gold resources on the basis of the past experiences of the Russian gold mining industry and taking into consideration the number of claims for which applications have been filed, and also the actual number of claims granted:

1. In 1910 for each gold mine that was being worked there were 3.65 which were not being worked. In 1913 for each gold mine that was being worked there were 4.11 which were not being worked. This is explained by the fact that the owners kept a certain number of mines in reserve.

2. In the old gold mining regions of Russia there still remain 139,000 poods of slich gold, although from these districts 231,000 poods have already been extracted. Thus the total resources of gold in these districts were 370,000 poods.

3. With the development of the mechanical methods of exploitation of gold mines, mining districts can be worked which were previously considered unprofitable because of the low gold content, and mines which contained from three to ten times less than what was considered minimum by application of manual labor, will be found profitable when worked by mechanical means. Many districts which were given up as hopeless or exhausted are now once more being worked. Consequently mines were constantly changing hands. It may be said with certainty that the number of mines which were considered worthless or exhausted or which were abandoned for other reasons by their prospectors, were very few in number in the Far Eastern Republic. According to the figures of Engineer Anhert, less than 10% of the gold mines in the territory of the Far Eastern Republic have been exhausted.

4. Taking into consideration all the sources of gold deposits for which no claims were filed because the mines were supposed to be unprofitable for development by manual labor, Engineer Anhert estimates that the probable remaining quantity of gold in the old gold producing districts is 183,000 poods of slich gold, which can be extracted by the application of mechanical methods.

5. Engineer Anhert estimates that the total of the Russian untouched gold deposits is no less than 1½ times the total quantity of the initial resources of the old gold mining districts of Russia, and that the total untouched resources of gold in Russia are 620,000 poods (10,333 1-3 tons). Figuring the cost of a pood of gold at 20,000 gold rubles, the total value of Russia's gold resources is 12,400,000,000 gold rubles.

On the basis of these calculations of the entire gold resources of Russia, gold resources of the Far Eastern Republic amount to 4,133,000,000 gold rubles.

An analysis of the figures in the tables presented above will show that although the territory of the Far Eastern Republic produced 33% of Russia's gold production, it employed 40% of

the total number of workers. This is explained by the fact that in the territory occupied by the Far Eastern Republic there was little application of mechanical methods, the work being done chiefly by manual labor.

A Russian geologist, Yavorovsky, called the attention of the committee above mentioned to the fact that while the total population of the Amur Province was at that time 300,000, there were actually employed 80,000 Chinese and Koreans in the gold mines of the province. The official figures showed that only 40,000 people of the yellow race were engaged in the gold mining industry.

Some of the mines in the Amur district were worked by purely chemical means which were very injurious to the mines.

Lately, because of war and revolution, and because of foreign intervention, particularly Japanese, the gold industry suffered a great deal. Because of the evacuation of Japanese troops from the Amur and Zabaikal provinces and because of the effords made by the government of the Far Eastern Republic the gold industry in the Far Eastern Republic is beginning to revive. The influx of capital and the application of mechanical methods of development are necessary in order to develop the gold mining industry in the Far Eastern Republic in proportion to its resources.

CHAPTER II

THE GOLD MINING INDUSTRY IN THE AMUR PROVINCE

THE ZEYA GOLD-BEARING DISTRICT

The Zeya gold-bearing district is situated in the basin of the river Zeya which commences in the southern descent of the Yablonov mountain chain. The length of the river is 766 miles. At the discharge of Zeya into Amur is situated the town Blagoveshchensk, the center of administration of the Amur Province. This part of the Amur River is fully navigable. The navigation along the River Zeya is due solely to the gold industry, but no sufficient survey of the river has been made as yet. The river is navigable along a distance of 610 miles, and the principal point of lively and regular navigation is the "Zeyskaia Pristan" (Port), which is 133 miles from Blagoveshchensk and 266 miles from the town of Svobodny (formerly Alekseevsk). The main ports are: Blagoveshchensk, Mazonovo and Zeya-Pristan. In 1909 there were shipped from the Zeya-Pristan goods totalling 560,000 tons and there were received 1,000,000 tons.

From the left side a tributary, Selendja, considerably navigable and 431 miles long and 80 miles away from the railway, discharges itself into Zeya. There are other tributaries on the left side of Zeya, viz., Depp, Urkan, Arga; on the right side, Tok with Urgan, Brianta with Unaha (Ilikan and Utuge), Giluy (with Big Djeltula and Small Djeltulak), Urkan (with Djelanda).

The rivers of the Zeya district—Zeya, Giluy, Brianta, Unaha, etc., are of the greater importance.

The greater part of the region under review is situated in the northern descent of the mountain range Tukuringaa which is extended along the right bank of the Giluy up to the

valley of the River Zeya and to the left bank of the River Giluy under another name.

Along the left bank of the river Giluy are to be seen a row of volcanoes, the highest of which is 4,000 feet. To the north of the left bank of the Giluy mountain chain is extended a slope-hillock locality which is a low plateau (altitude 2,800 feet), divided by numerous valleys. The whole of this country may be said to be the prototype of woody mountainous Siberian swamp which is at the water-sheds mossy and in the valleys marshy. In the direction of the mouths of the rivers Brianta, Dambuka and Magota, the whole locality gradually grows lower, until it coincides with the chalice line extension of the alluvial valley of the river Zeya.

GEOLOGICAL STRUCTURE

The Archaen middle-sized, light gray granites constitute two considerably large even areas along the rivers Ilikan and Brianta.

In the structure of the locality the most important part is played by the gneisses. Nearly the whole territory is made up of this mineral with the exception of small areas of granites and the Jurassic precipitates.

Among the gneisses, but in lesser quantity, is found hornblende, which is noted for its gold-ore making qualities. The Jurassic precipitates are composed of conglomerates, sandstones and argilites, as well as of crystallic limestones and phyllites.

The massive crytallic rocks consist of two dissimilar groups. The greater number are granites, with veins of aplites and quartz porphyries. More rare are the diabastos and prophyrates. The vein-quartzes are chiefly of the watery-transparent varieties.

The auriferous sands in all probability can be traced to pliocenes. They are represented by channel types, as well as by the so-called "bench" types.

The valleys of the larger rivers are made of the present-day deposits, left there by running waters. They all contain gold, and, therefore, may be regarded as the present day auriferous sands. Most attention must be paid to the auriferous sands of the river Zeya and the sands of the lower part of Unaha and Brianta.

GOLD CONTENT

According to the opinion of local geologists, the original source of the earth's gold is the mineral-mass of the gneiss' nature, and, in particular, the horneblende contained therein. That rocks which contain horneblende in great quantities are exceedingly auriferous is a fact beyond question. It has been definitely established.

Of the considerable important auriferous rocks there are also the granite rocks—pegmatite, aplite. All rich deposits are in the region where these rocks are found in great abundance.

Vein-quartzes as a rule show but little gold content.

Auriferous sands which are considerably rich in gold are those which are found among gray gneisses, amidst veins of granite.

Among the present-day gold sands deposited by flowing water are almost all those in the mouths of Unaha, Brianta, and other important rivers. For instance, at the place of discharge of Unaha into Brianta there is \$0.75-\$1.50 gold to each ton of gold-bearing gravel.

There is the probability that gold is contained in the Jurassic deposits, left after the breaking up of the gneiss's thickness.

Mines which contained such quantities of gold as yield \$8.00 and more to each ton (as the mine of Djalon), may be regarded as exhausted. At the present time mines containing \$0.90 and \$1.50 in a ton are being worked.

There is no doubt that within the gneiss' area there is quite a good deal of auriferous sand deposits, the contents of which are less rich, which have not been worked as yet. With the improvement of economic conditions all these deposits, and later the poorer ones, will begin to be worked, thus rendering possible a lengthy existence of mining.

At the present the following are of importance in gold mining:

- 1) "The Gold Mountain"—at the head of the river Hudger (system of Giluia)
- 2) Tributary Uspensky along the river Djuwaskite (system of Giluy).
- 3) Ore veins of the Djalindsky region.

A more detailed report on the nature of gold-content can

be obtained by uniting the various deposits in groups. In this connection, the grouping is made: first—according to their situation in the same river system; second—according to the similarity in organization, exploitation and means of labor; third—as to the administration being common; fourth—as to the likeness of the origin, structure and the contents of the deposits; fifth—as to the conditions of the means of supplying foodstuffs and goods; sixth—as to the common means of communications.

- | | | |
|-----|----------------|---|
| 1. | Group of mines | along the lower part of the river Unaga. |
| 2. | " | Big, Medium and small Uldekite |
| 3. | " | the lower part of the river Ilikana |
| 4. | " | rivers Big and Small Emak |
| 5. | " | river Djalta |
| 6. | " | river Djaion |
| 7. | " | the middle part of the river Ilikana |
| 8. | " | Big and Small Smulen |
| 9. | " | upper part of the river Ilikana |
| 10. | " | middle part and upper part of the river
Unaha |
| 11. | " | r. Brianta with tributaries: Utuegi,
Sivak, Ugagli |
| 12. | " | r. Kudachi and Dambuke |
| 13. | " | Big and Small rivers Mogota |
| 14. | " | rivers Konmuni-Iliagir, Djagda-Iliagir,
Belaya |
| 15. | " | Ugan and Amundjak |
| 16. | " | lower part of the river Giluy |
| 17. | " | middle part of the river Giluy |
| 18. | " | upper part of the river Gilluy |
| 19. | " | r. Suchdjary and Gargan |
| 20. | " | the river Toka |
| 21. | " | the river Suchdjarikan and Nolda |
| 22. | " | the river Gullik and the middle part and
lower part of the river Urkan |
| 23. | " | the river Djalinda |
| 24. | " | the river Ingagly |
| 25. | " | the river Yankan |

All the groups can be united into four systems:	
1) The system of the middle part of Zeya and Giluy	247 areas
2) The system of the upper part of Zeya.....	23 "
3) The system of the lower part of Zeya.....	11 "
4) The system of Urkan and Oldoy.....	50 "

	331 areas

In the whole of the District there were in operation 105 mines (1907) of which number 75 were situated as follows:

In the system Giluy.....	20 mines
Unaha	10 "
L. Djalta	15 "
Djalon	17 "
Magot	7 "
Dombuk	6 "

Along the other rivers there were in operation from one to three mines. The output in the Zeya district was as follows:

In 1901 about	7,200 lbs.
1902 "	72,900 "
1903 "	7,740 "
1904 "	4,572 "
1905 "	3,222 "
1906 "	2,070 "
1907 "	1,872 "

THE FIRST SYSTEM of the middle-part-of-Zeya and Giluy occupies the central place in the District and is of great importance as to the output of gold. To the first system belong eighteen of the above-named groups of mines, where there are situated 247 areas of the total of 331 areas in the entire Zeya system.

1. Group of Mines of the Lower Part of the River Unaha.

In the group of mines situated in the Valley of Unaha, between Uldekite and Ango, five mines have been at work solely on the basis of payment to workers being made in gold. The river Unaha flows through a narrow valley bound by high abrupt slopes, and sometimes, by abrupt cliffs. After the mouth of

Ilikan, the river makes a lot of zigzags, flowing through a gneiss' stratum. At three miles above the discharge into Brianta, the valley does not extend itself considerably, the banks having the form of slopes. There is a possibility of existence here of a rich deposit made by flowing water. The thickness of a layer is 2 feet; the turf is 4 feet. Partly by way of packroads, partly by trails, the river is connected with the Dambukitsky Storehouse.

2. Group of Mines of Big, Medium and Small Uldekite.

Applications have been filed for 19 areas, situated along the river Big Uldekite (the right tributary of the river Unaha) with its left tributaries Middle and Small Uldekite.

The river Big Uldekite (17 miles) flows across a gneiss stratum full of folds. There is a great deal of deposits, varying in contents and standard, and in the shape of lying in the earth. The layer is 2-7 feet, turf 2-12 feet. The average compound contents of gold is \$1.35 to one ton.

3. Group of Mines Along the Lower Part of the River Ilikan.

The lower part of the river Ilikan, in its valley, along a length of 20 miles up to the mouth of Big Sigulen, there are eight areas. Gold of average size—\$0.90-\$1.50, average fineness 953 (953:1000). The layer—3 feet. The average compound contents of gold is \$1.00. The fall of Ilikan is 0.0018-0.002. The flow of water—283 cubic feet in a second.

The ground is always frozen.

4. Group of Mines of Rivers Big and Small Emak.

The river Emak discharges itself on the right side into Ilikan. The length of Emak is 9 miles. Along it there is a small group of mines. The width of the valley—5-7 feet. The fall is 0.013. There are often floods which affect the works badly. The layer, 2-4 feet; turf, 7-11 feet. Compound contents of gold \$0.90-\$1.50. Gold of average size. Average fineness, 952.5.

5. Group of Mines of the River Djalta.

The upper part of the river Djalta is of gneisses, while the lower part is of granites. The upper part of the mine: the layer,

5 feet; turf, 7 feet. Th compound contents of gold \$2.40. Fineness, 960. After the Djalonsk group this is the richest group of the Zeya region. The river freezes by October 1st-20th, thawing from April 10th-20th. The method of mechanical delivery of sands for washing has been used.

6. Group of Mines Along the River Djalon.

The group of mines along the river Djalon is situated in the center of the system of the right tributaries of the middle part of the river Zeya. It is one of the two richest mining groups of the whole Zeya region. Twelve gold mines which have been at work are situated along the channel and the "benches" of the river Djalon. The length of the valley is 5 miles. The width is 700 feet. It breaks into granular granite. The layer is 12 feet; turf, 7 feet. The compound contents of gold, \$3.33.

Gold grains are of small size, scaly—in the lower and middle part of the deposit. Fineness 970. In the upper parts they are of greater size (fineness 951).

Ore gold has been found on the right slope of the valley of river Djalon. Applications have been filed for two areas, but no work has been done. According to rumors, in the massive Djalon granite diamond boring was made in order to find gold-containing veins.

7. Group of Mines in the Middle Part of the River Ilikan.

To this group belong:

1) The river Sanar (the right tributary of Ilikan). The valley is deep and wide. The compound contents of gold, \$1.35. Fineness, 951.

2) The river L. Djendagli (right tributary of Ilikan). General characteristics: Layer, 12 feet; turf, 7-28 feet. Compound content of gold, \$1.50. Gold varying (nuggets up to 0.1 lb.). Average fineness, 940.5.

8. Group of Mines of Big and Small Sigulen.

The river Big Sigulen (left tributary of Ilikan). Width, 140-350 feet. Gold of large size in the upper part of valley; gold of small size in the lower part of the valley.

The layer, 5 feet; turf, 18 feet; average fineness, 912. Compound content of gold, \$1.32.

All the groups which have been reviewed so far (from 3-8) form a series of central mines of the Zeya system. Most of the work has been of a preliminary nature.

9. Group of Mines Along the Upper Part of the River Ilikan.

The group of right tributaries of the upper part of the river Ilikan is connected by a vista (20 miles long) with the central mines. The vista is accessible in winter, but very marshy and dusty in summer.

The river Arga (the right tributary of Ilikan). One mine Ilynsky. The layer, 2 feet; turf, 7 feet. The compound content of gold, \$0.75.

The mines along the river Olongro (the right tributary of Ilikan) were not being worked.

The river Amunachi (the right tributary of Ilikan). The layer, 3 feet; turf, 12 feet. The compound content of gold, \$0.76. Fineness, 934.

10. Group of Mines Along the Middle and Upper Part of the River Unaha.

The river Unaha and its tributary Besimyannaya (drop 0.02) and Thema. The majority of mines are those having the channels of the river containing gold. One hillock mine (Yasonov Klad) has been at work. The layer, 3 feet; turf, 7 feet. The compound content of gold, \$0.82. Fineness, 867. Substance of rocks: Biotite gneiss including numerous layers of pegmatites. On the right bank of the river Besimyannaya near Yasonov Klad there was one mine for which an application was filed, but no work had been done there.

River Olongro and its right tributary Burgali. In this group there was only one mine at work; connected with a vista, partly marshy. In summer access to it can be had only by packroad. The layer, 5 feet; turf, 11 feet. The compound content of gold, \$1.02. A constituent of the rocks is the sulphurous pyrite, the principal of it being green-stone rocks which are especially rich. Nuggets are not found at all. The width of the river Unaha in this place is 210-280 feet. Drop, 0.0017 feet. The extraction of

gold from the channel can be made by means of a dredge only.

11. Group of Mines of the River Brianta with Tributaries.

This group, consisting of four mines, is situated off the central mines. The delivery of goods by boat is possible along the river Brianta up to the mouth of the river Utugei.

There is a considerable increase along the river Brianta, and its tributaries of deposits made by flowing water. In all probability, they are gold-containing. Therefore hope is entertained that in the lower parts of the river Brianta and its tributaries Utugei, Sivak and Ugagli work can be done by means of improved methods. The dredging of the channel and the sand banks of the river Brianta is but a matter of time.

12. Group of Mines of the River Kudachi and River Dambuk

The river Dambuk, the right tributary of the middle part of Zeya, flows through a gneiss' thickness. Four mines. The layer, 5 feet; turf, 9 feet. The average compound content of gold, \$1.00.

The river Kudachi (Kuduli) is the right tributary of the river Brianta. Three mines. The layer, 5 feet; turf, 8 feet. The average compound content of gold, \$0.94.

13. Group of Mines of the Rivers Big and Small Mogot.

To this group belong the rivers Big Mogot and Small Mogot, and Besimyannaya (the right tributary of the Big Mogot). There are in this group 15 areas, 5 mines. The layer, 5 feet; turf, 9 feet. Th average compound content of gold, \$1.28. The average fineness, 868.

The river Big Mogot (20 miles long), 4 mines. A wide valley is situated along the gneiss' thickness. Average drop, 0.0107.

The river Small Mogot (14 miles long; the tributary of the Big Mogot). Applications have been filed for 4 areas.

The river Besimyannaya (the right tributary of the Big Mogot); applications have been filed for 8 areas.

14.. Groups of Mines of River Kongamuni-Uliagir, Djagda-Uliagir and River Belyaya.

The group of mines situated along the river Kongamuni-

Uliagir consist of 4 areas. The average compound content of gold, \$0.91. Fineness, 898.

Djagda-Uliagir, 3 areas. The average compound content of gold, \$1.19. Fineness, 878.5.

The groups are near to the Dambukitsky Storehouse. The mines are situated in the most upper parts of the river. The dike is biotite and horneblende gneisses. These gneisses and the veins of horneblende granite, pegmatite and aplite intersect each other.

Among these is included Belya (Besimyannaya), 8 miles long with three areas. The layer, $2\frac{1}{2}$ feet; turf, 10 feet. The average compound content of gold, \$1.22. The average fineness, 896.

15. Group of Mines of the Rivers Ugan and Amundjik.

The river Ugan (12 miles long; the drop 0.0114), 12 areas. The river becomes frozen by November 1st-15th, while the breaking up of the ice takes place by the first of May. The water in the river is high (floods) twice a year—in May (from the thawing of the snow), and in August (from rains). The draught lasts from May 15th to June 20th. The dike, biotite and horneblende, gneisses and slates with sulphurous pyrites. The layer, 4 feet; turf, 12 feet. The average compound content of gold, \$1.15. Fineness, 889. The river S' Amundjak (the right tributary of Zeya). Applications have been filed for three areas.

16. Group of Mines of the Lower Part of the River Giluy.

The group is situated in the lower part of the river Giluy, with its tributaries, Utensak (the left tributary of Giluy) and Nijni Chimgan (the right tributary of Giluy). The lower part of the valley of the river Giluy is bound by high slopes and often by abrupt cliffs. Large sandbars are rare, in view of which it is little fit for regular works. Many cataracts. The drop, 0.001. All along, 54 miles, are developed gneisses and granite-gneisses with quartz veins of the shape of a layer. The layer is 2 feet; turf—7 feet. The average compound content of gold—\$1.11. Fineness—888. Applications for nine areas have been filed.

17. Group of mines of the middle part of the R. Giluy.

The middle Giluy is superior to all other parts of Giluy for

the quantity and richness of the mines. Applications for seven areas have been filed.

The river Upper Kamray (the left tributary of the river Giluy, near Argaskite). Applications have been filed for two areas. The valley is 6 miles long, considerably narrow, and abrupt. Situated among mica and horneblende gneisses intersected with veins of half transparent, partly smoky quartz (dark quartz which is not transparent), and considerably large veins of reddish pegmatites.

River Argaskite (the right tributary of Giluy). The valley is six miles long. One mine. There can also be seen a gneiss syncline. The river Daburkit with a right tributary Hugder. Applications for 11 areas have been filed. The mines of the river Hugder are of two kinds: the modern—the channel mines which are situated up-the-river; the old fashioned "bench" mines which are situated down-the-river. Judging from the considerable difference in the fineness of the gold of the upper and lower part of the valley, uneven distribution, the channel mines are situated at the mother lode. The layer—5 feet; turf—8 feet. The average compound content of gold—\$1.28. The "bench" mines are known for the large gold-sand-alluvium, uneven but rich content of gold.

The river Djevaskite (the right tributary of Giluy, 14 miles to the north of the mouth of Dabukit). The width of the marshy valley, 8 miles, the length—26 miles. Applications have been filed for 12 areas.

The general characteristic of the group: layer—5 feet; turf—7 feet. The average compound content of gold—\$1.35. Fineness—958.

18. Group of mines of the upper part of the river Giluy.

The Upper Giluy. Applications for 28 areas have been filed. 7 mines are being worked.

To this group belong: the river Amunachi (the left tributary of Giluy; the rivers Luchi, Ika, Talma). The layer—2 feet; turf—7 feet. The average compound content of gold—\$0.86. River Talga. The layer—3 feet; turf—9 feet. Average compound content of gold—\$1.91; the river Djeltula and the river Djeltulak.

All three groups of mines situated in the basin of the river Giluy (Lower, Middle and Upper) are lying among gneiss network, with numerous outlets of pegmatites and aplites. All mentioned substances of rocks contain often ingredients of sulphurous and copper pyrites and magnite iron-ore.

THE SECOND SYSTEM, covering the mines of the right tributaries of the river Upper Zeya, is situated along the tributaries of the river Tok and is way off the central mines of the river Zeya.

In summer the communication between the mines is by ships and boats; in winter—by sledges along the ice of the river (from November to April) as far as the Dambukitsky storehouse. During almost two and a half months communication between the mines is carried on along the marshy forests' pathway (from the mines Yasonov Klad—167 miles) solely by reindeers.

19. Group of mines of the rivers Suchdjari and Gargan.

The river Big Suchdjari (the right tributary of Zeya, about 104 miles above (to the north) the Dambukitsky Residence. Applications for eight areas have been filed.

The river Gargan (the right tributary of Zeya, 14 miles above Suchdjari). Applications have been filed for two areas. One mine at work.

General characteristics: layer—5 feet; turf—15 feet. The average compound content of gold—\$2.63. Fineness—779.

20. Group of the mines of the river Tok.

The river Tok—132 miles long. 6 mines are at work. With the exception of one mine situated at the bank of the right tributary of the river Tok-Haraganjo, all the others are situated along the river Sivakan (the left tributary of the river Tok, 20 miles off the mouth). Means of communication are very difficult.

River Sivakan. 7 areas have been applied for. The layer—5 feet; turf—7 feet. The average compound gold content—\$1.34.

21. Group of mines of the rivers Suchjarikan and Nolda.

The little group with three areas is situated off the central

district along the Suchjarikan and its left tributary Nolda. Communication is carried on by packroads. Gneisses and granite-gneisses with veins of pegmatite and aplite. This district is similar to that of Middle Zeya as far as the situation of rocks and their character are concerned. Known for the low fineness of gold—816, but the mines are very rich.

THE THIRD SYSTEM is situated along the right tributaries of the lower part of the river Zeya.

22. Group of mines of the rivers Gullik and Ukran (the lower and middle part of the river).

The river Gullik. One mine at work.

The river Urkan (the lower and middle part of the river). Applications for ten areas have been filed. The group was being worked on the basis of the workmen being paid in gold. Far away from the warehouses and miners' homes. The average fineness—845.

THE FOURTH SYSTEM is also off the Zeya district; the system is situated along the upper part of the river Urkan and its right tributaries Djilinda and Ingagli, as well as along the river Jankan belonging to the system Oldoya (the left tributary of Amur). The majority of works are carried on by lease-holders. A common good horse-road, 70 miles long, connects the group with the harbor Reinovo, s. Amur. Sometimes the communication is carried on by camels.

23. Group of mines of the river Djalinda.

River Djalinda (the right tributary of Urkan). Gold ore has been discovered at the southern slope of Djalindinda Goltz at the summit of the left side of the right summit of this river. Applications have been filed for 9 areas, but no extraction of gold ore has been made. The surveying consisted of dividing into squares, the installation of shafts and "Stollen" for tracing of veins contained in the granite. The content of gold is from \$3.75 to \$13.50 for each ton.

24. Group of mines of the river Ingagli.

The river Ingagli (the right tributary of the S. Urkan); applications have been filed for 6 areas. Flows through gneiss'

granites. The layer—2 feet; turf—11 feet. The average compound gold content—\$1.20. Average fineness—955.

25. Group of mines of the river Yankan.

The river Yankan (the right tributary of Krestovka which is the left tributary of Oldoy) flows, alike to the river Djalinda, through a land stratum of metamorphic schists, phyllites, sandstones, conglomerates, limestones, and various schists. The land-thickness is intersected by veins of prophyrites, and hornéblende of the granite type, and is situated, on reaching the lake, near the granite Djalindinda Goltz. Some qartz veins intersect granite, as well as metamorphic schists. More than 18 gold-bearing veins have been discovered, but no development in the work has been made.

THE SELIMDJA AND NIMAN DISTRICTS.

The Selimdja District.

General Survey—The river Selimdja, the left and considerably large tributary of the river Zeya, is situated at the northwest slope of the mountainous chain Yam Alin, which is one of the branches of the northern boundary of the Burein mountain range, or the small Hingan.

The whole length of the river (from head to mouth) is about 400 miles; the river's fall is 3,444 feet, and the average fall amounts to 0.0017.

As regards the surface of the basin of the river Selimdja from the head up to winter camp, the surface is hilly; down to the mouth the surface is plain. The river Selimdja is fit for navigation up to the Norsk warehouse only, viz. along the distance of 84 miles, and, further, to the north to the Ikimchan Storehouse, only by vessels of light draft, the navigation being very difficult.

The river Harga, the left tributary of the river Selimdja, is the largest tributary of Selimdja; the length of river Harga is 72 miles; average fall 0.006; the width of the valley of the river Harga is varying, from 100 feet, at the river head, to more than one mile.

Description—The Selimdja gold bearing system covers a

group of mines situated along the tributaries of the river Selimdjia.

The characteristic of the system is the scattering state of the mining groups; thus the distance between the mines situated along the tributaries up-the-river Selimdjia and the group of mines situated down-the-river Selimdjia is more than 270 miles.

Of the groups of mines mentioned above a description will be given only of those of interest and worthy of special attention.

1. The District of Harga.

In the district of Harga are at work the mines Zlatoustovsk and Shedrinsk. The Zlatoustovsk mine is situated along the river Harga, at its left side and between the mouths of Dagandin and Albin.

A part of this mine was worked by manual labor, the thickness of the turf having been from one to five feet. The thickness of the layer is from one to two feet, and the content of gold up to \$15. The work was possible only with the water being low, for the height of the area above the level of the river Harga is not more than two feet. At the present this mine and the adjacent mine, Jadrinsk, are being worked by three dredging machines. The area of the Zlatoustovsk is 675 acres.

The Jadrinsk mine is situated along the creek Albin, which discharges itself into the river Harga; the area of the mine is 15 acres.

The creek Albin, along which is situated the Jadrinsk mine, which is 1.5 miles long; the width of the stream within the claim is nearly nine feet. The average deviation of the length is about 0.03 feet; the width of the valley is about 1,750 feet.

The valley of the Albin creek and the river Harga in this section has an abundance of water and forms a basin. The mine is situated in a place which is always in a frozen state. The depth of the freezing of the river Harga is about 5 feet, and that of the Albin stream about 2 feet. They freeze at the beginning of November and thaw at the beginning of May.

Up to the present time the mine was being worked by manual labor; the thickness of the turf is 9 feet, and that of the layer—7 feet, and the average content of gold—\$1.90. The

gold is distributed evenly; the fineness is 895—898; the gold is small-grained.

As already mentioned above, at present the Jadrinsk and the neighboring mines are worked by three dredges. All three dredges are of 5 lb. capacity, of the system Verf-Conrad, the daily production of each dredge being 1,270 cubic yards.

The places for dredge-work are still very large and thick, the average content of gold being \$0.38 per ton. The average number of working days per year is 180.

In the region of Harga, of interest is the mine Olginsk along the river Elge and at the mouth of the stream Afanasieffsk. On the right slope of the valley there is a "bench" gold mine.

2. District of the Big and Small Naergen, the left tributaries of the river Selimdja.

Of the mines covered by this system, attention should be paid to the mine Maisky, being 150 acres in area. The valley down-the-river small Naergen, where the Maisky mine is situated, is very narrow, the width of the valley being not more than 900 feet; the surrounding mountains border on the river valley by narrow capes; the channel of the river is very winding; the nature of the gold-bearing layer is varying and the gold there is distributed unevenly. The average thickness of the turf is about 5 feet; of the river bed, $5\frac{1}{2}$ feet; and of the layers up to 5 feet. The average gold content, \$1.20. The layer consists of thick, heavy and dark-gray lime, as a result of the destruction of the formerly common schists; the gold is small-grained, flat and smooth.

3. The Region of Semertak, the Right Tributary of Selimdja.

Manual labor has been instrumental in the partial exhaustion of the gold-bearing area which is situated along the lower part of the river Semertak, viz. the claim of the mine Blagoveshchensk, belonging to the Ust-Semertaksk Co. Now a dredging machine is being brought into employ for the extraction of the remainder of the gold; the capacity of the scoops of the dredge is $2\frac{1}{2}$ cubic feet; the daily production, 760-900 cubic yards; the thickness of a layer is 2 feet; the thickness of turf,

up to 10 feet; the average gold content is about \$2.25 to one ton of sand, or \$0.33 to one ton of sand and turf.

In this region the river Selimdja is also auriferous and contains from \$0.15 to \$0.27 gold to 1 ton of earth, which renders it possible to exploit it to greater advantage by using a dredging machine, with a scoop capacity of 18 cubic feet. It would certainly be a large and profitable business if use of these possibilities was made.

4. The Region Nekly.

A whole number of mines worked by the Nijne-Selimdjinsk Co. is situated in the basin of the middle part of the river Nekly—which is a relatively small right tributary of the river Selimdja—and along the streams Khrabry and Utesny, discharging into Selimdja. Manual labor has been instrumental in a partial extraction of gold, but there still remain a number of areas which are not suitable for manual labor and which must be worked by mechanical methods.

Along the river Nekly and the stream Vesely, which discharges on the left into the Nekly, are situated two main mines: 1) Stretensk along the river Nekly, and 2) Vesely, along the stream Vesely. Both mines are situated in a plain covered by a marsh. In the Stretensk mine the thickness of turf is varying from 2 to 3.5 feet; the thickness of the layer, 4-6 feet; the content of gold in the remaining areas, \$0.45-\$0.60 to one ton of sand; the gold is small, round grained.

In the mine Vesely the gold is large-grained, porous, with quartz; the turf is here about 2 feet. The turfs consist of a vegetable layer and clay of bright colors. There is a likelihood that there is a gold-containing layer underneath, while for washing the whole portion of land (2-11 feet), immediately under the vegetable surface and up to the clay which is not gold-containing, is taken. The method of washing of such a layer in barrels would not be practical, as a great amount of gold would be lost; the waste could be washed over again to good advantage.

Along the stream Khrabry, which discharges itself on the right side into the river Selimdja, is situated the mine Dagmara.

The thickness of the layer is up to 4 feet, and the thickness of the turf to 7 feet. The gold is not large-grained. It is partly flat. The average content of gold is \$1.50 per ton of sand.

The Niman District.

General Information

All the mines of the so-called Niman system are situated within the boundaries of small area, viz. the area bound by the river Niman, its tributary river Olga, and the latter's tributary river Samar. The area has a considerable absolute height. The lowest point of the area, viz., the river Niman, is 2,625 feet above sea level. The difference of the longitude of this area is nearly 27 miles, while the difference in the latitude is not more than 20 miles. All the rivers and streams as well as Niman and Olga, the main rivers of this territory, have a very abrupt fall; for instance, the fall of Olga from the Soffyisk mine up to the mouth of the river is about 0.003. The fall of tributaries is even more abrupt. The daily outflow of water of these typical mountain rivers varies greatly. A little river hardly noticeable in summer turns into a stormy water-duct which in a short space of time causes a great deal of harm. The water rises very rapidly, but subsides equally as fast.

Some of the valleys have quite clear terraces. Such is the valley of the river Olga, especially above the Soffysk mine, where two terraces can very distinctly be seen. One terrace seen at the horizontal junction is approximately 70 feet above the river level, and the other, seen at the horizontal junction, is about 140 feet above the river level.

Ways of Communication

The main means of communication with the mines in summer, as well as in winter, is the river Bureya.

From the Soffyisk mine, the center of the Niman system, a road extends along the valley of the river up to the winter camp, near the discharge of the latter into Niman.

From the Niman ford the road makes way along an abrupt stream and creeps over the valley of the river Umalta, the summit being 525 feet high. Further on, the road extends along

the slope of Umalta as far as the place of the discharge of the latter into the river Bureya. The distance from the mines to the Ust-Umaltin winter camp is 67 miles. Notwithstanding rapids and cataracts, the navigation from Ust-Umaltin Storehouse up to the mouth of the river Bureya, 306 miles, is more or less safe. Further below the Ust-Umaltin winter camp along a distance of 90 miles up to Chekundin Storehouse it is navigable by large boats (junks), the loading capacity of which is about one ton. During the season of flood or at the time of a flood, steamers with light draft are able to reach the Ust-Niman winter camp, 40 miles off the Umaltin Storehouse. The distance of 216 miles from Chekudin Storehouse up to the mouth of Bureya is navigable by light boats with a light draft at any time of the year.

The winter road has the same direction.

Description of Gold-bearing Territories

According to the geological data compiled by the geologist Yavorovsky, who made investigations in the Niman system, all, or nearly all, sediments of the rivers of this territory contain more or less gold and may be regarded as "auriferous sands" in the sense of this term; of course, it will depend upon the conditions and methods of work whether the gold-bearing systems will prove productive or not. It must be admitted that the methods employed heretofore in the gold industry of the Niman system have not been satisfactory. The enormous richness of the deposits, on which the profits in the seventies of the past century amounted to millions (over 100% for some years, and 61.23% for average year during the period 1886-1890), made it possible to consider the rough methods of exploitation as sufficiently fit, and there was, accordingly, no inducement for the improvement of the methods. The Niman Company, which at the time was the all-powerful company in this district, has been exerting all means to prevent the establishment, in the vicinity of the mines, of the small scale gold industry.

As a result of this, when all the large and investigated deposits with high gold content have been exhausted by the Niman Company, their method of exploitation proved to be unprofitable for the exploitation of the poorer areas, the latter,

besides, being insufficiently investigated. In view of this, the Niman gold industry has stopped, little by little. However, there is no doubt that in the Niman system there is still a great number of areas which are fully fit for a regular exploitation, in particular, by mechanical means.

Of this category of areas special attention should be paid to the Sofyisk and Ioann-Krestitel mines situated along the river Olga.

Although the discovery of the whole of the Niman system was begun with the discovery of the Sofyisk mine, the exploitation of the latter in the years immediately following has been confined to the exploitation of gold of the rich district "Zolotoi Yar," and also relatively small underground works were being carried on near the mouth of the streams Kanaka and Sofyisk; the exploitation of all other deposits of the district was, under the existing conditions and methods of work, considered by no means possible; therefore in these regions of the gold area there is a large quantity of gold which can be extracted to great advantage if more advanced methods of exploitation are employed.

The upper part of the Sofyisk mine, between the mouths of the rivers Agda and Kanaka, has been investigated in more detail; the results of the investigation are shown, in approximate figures, in the following table:

Districts	Thickness		Area in Sq. feet	Turf Cu. feet	Layer Cu. feet	To Cubic Yd of gold lbs.		Quantity of gold—lbs.
	Turf ft.	Layer ft.				Layer	Layer and Turf	
Part of the Sofyisk Mine above Nikolaevsk 2569 feet	24	1,75	1,036,742	24,921,808	1,814,299	0.025	0.0011	1,048
Next to the north of Sofyisk 2975 feet	22	1,5	1,021,307	22,468,754	1,531,960	0.016	0.001	883
The balance of 2450 feet adjacent to the Timofey Mine	35	1,4	1,516,746	53,086,110	2,123,444	0.026	0.001	1,998
Total								3,929

The distance of one mile of the lower part of the Sofyisk mine between the mouth of Kanaka and the stream Sofyisk has been investigated but very little.

On going over the foregoing table, sight must not be lost of the fact that the thicknesses of the turf and the layer, as is shown above, cannot be considered to be quite exact. In a great number of instances, the quantity of the layer proves to be much more, but it is a little poorer than that shown in the table, for the bottom layers of turf often contain \$0.30-\$0.45 to one ton, and it is but just that they should be considered gold-bearing layers although the latter is thus rendered poorer, the average content of turf and layer of gold, however, being somewhat increased.

As mentioned above, a small area of the Sofyisk mine had been worked out and nearly 6,480 lbs. of gold had been extracted, the average content of gold being \$0.61 to a ton. Alike, a small portion of the area of the Ioann-Krestitel mine had been worked out, the average content of gold being \$5.25 to a ton.

As compared with this figure, the content of gold of the Sofyisk mine, \$2.05, as is shown in the table above, is, of course, small, and in order to make the exploitation of this place profitable new and cheaper methods of exploitation should be introduced. One of these methods is the washing of the turf, there being a lot of water in the river Olga. An experiment in this direction was made, and, at the beginning, it proved to be very successful, but later on the administration of the mine changed, and resulted in not applying this method to the fullest extent.

As regards the Ioann-Krestitel mine, which is situated beyond the Sofyisk mine, it has not been investigated in full, and its lower part has not been investigated at all.

In all, these two territories may be considered as containing 7,200 lbs. of gold, the extraction of which may prove profitable with methods of exploitation which are more regular and advanced. With such advanced methods of exploitation the whole number of smaller areas along the river Olga and Toen-Elga could be worked to great advantage.

CHAPTER III.

THE GOLD MINING INDUSTRY IN THE BAIKAL REGION

I.

THE ZABAIKAL DISTRICT

Brief Historical and Statistical Data.

The gold mining industry in the Baikal Province had come into existence in 1832, but it was only in the beginning of the forties of the past century, when rich mines had been discovered, that the gold mining industry had gained importance from the point of view of gold industry.

These rich mines are: Karyisk, Shachtalin, Kazakov, Tainin, etc. Following the discovery of these mines there had been a gradual development due first, to the discovery of new mines, secondly to a more intensive exploitation of the mines chiefly by methods of gang work, and thirdly to the granting of permission for the establishment of private ownership of gold mines in the Western part of the Nerchinsk District. Thus in 1914 the output of gold in the Transbaikal Province reached about 14,400 lbs. This was the quantity which had been officially registered, but it must be taken into consideration that a great deal of gold has often been hidden from registration, mainly because the gold owners wished to avoid payment of a 5% tax in kind to the Department of Imperial Crown Lands, which had been the chief landowner in the Baikal region. The real figure of the output of gold in this region in the years immediately previous to the war must therefore be taken to be nearly 36,000 lbs.

The Department of Imperial Crown Lands was in the lead, as far as the exploitation of gold in the Baikal region is concerned. The works carried on by private gold-mine owners were, on the whole, very little, the output being somewhat in

the neighborhood of several poods and sometimes pounds. The department of Imperial Crown Lands, as well as private gold-mine owners, have been applying primitive methods of exploitation; in earth-works which were done at the mines manual labor only had been used. This is true, with the exception of a small dredging-machine installed by Mr. Novomeisky, a private gold-mine owner, in the river Zepikan (in the Bargusin marshy forests),—the dredging machine working quite satisfactorily—and an excavator which is used at the mine Shuvikh along the river Kruchina. It is evident that with the employment of manual labor only, it proved advantageous to exploit solely the richer areas, where the contents were not less than \$0.18 in a ton of sand and turf (in the case of superterraneous works), and not less than \$1.50 per ton of sand with the gold-containing layer not less than 4 feet (in the case of subterraneous works). All areas, where the gold contents were less than the figures just mentioned, were being considered disadvantageous for the industry, and no attention was paid to them, while with the application of mechanical methods of exploitation, the neglected areas could be worked with great advantage.

New gold-bearing deposits were being searched for and investigated into just as much as the exploitation of gold-bearing areas was being carried on.

On reviewing the map showing the resources of gold at mines formerly belonging to the Department of Imperial Crown Lands, it is evident that the annual gold output has been about 7,200 lbs., while the resources of gold in reserve had been remaining at all times about 1,000-15,000 lbs. This is explained by the fact that the Department of Imperial Crown Lands did not make strenuous efforts towards new discoveries, and work for the purpose of new discoveries was being carried on to the extent of filling the requirements only, so as not to face a cessation of work. In view of this, the greater part of the Nerchinsk District has not been investigated at all, not to speak of examining the discoveries. In spite of this, the non-investigated regions of the Nerchinsk District are of a very great importance as far as the possibility of new discoveries of gold is concerned. These will be dealt with later on. The method of investigation, in itself, has been very primitive; the method

of investigation, by means of drills, has been brought into application just before the war. Almost sole attention at the investigation and examination works was being paid to the discovery of new or channel auriferous sands (deposits), outside of which nothing had been exploited; the old, or very deep deposits have been worked on very few occasions; to the latter category belong the Kazakovsk and Novotroitzk, old deposits which are at present worked.

There is no doubt that in the event of investigations of new deposits, made in a proper manner, a great number of old deposits are likely to be brought to light.

As regards ore deposits of gold, the exploitation of these in the Baikal region has not been made at all—although there is a great number of ore deposits of gold in the Baikal region.

DESCRIPTION OF REGIONS IN WHICH THE GOLD-MINING INDUSTRY COULD BE DEVELOPED PROFITABLY

1. Undin Region.

The Undin region consists of two main gold centers: Kazakovsk and Novotroitzk. They are situated in the South-eastern part of the Baikal region, along the river Unda, a tributary of the river Onon—the Kazakovsk deposit being 20 miles off the station “Biankino,” of the Transbaikal Railway, and the Novotroitzk deposits being 30 miles off the station “Priiskovaia” of the Transbaikal Railway. These railway stations are connected with the mines by good highways.

The mines are situated in a wide and open valley of the river Unda which is very fertile and thickly inhabited—mainly by cossacks engaged in agricultural work. A road of 17 miles along a good and even plain connects the Novotroitzk and Kazakovsk mines.

Kazakovsk Mines

The region of Kazakovsk gold mines is contained between the stations “Undinskaya Sloboda” and Kolobovsk village, along the right tributaries of the river Unda.

Almost all the mines are situated in a direction perpendicular to the valley of the river Unda—the methods of the mines

discharging into the river Unda so that the valley of the latter is in this place also gold-bearing, which has been proved by investigations. Mention should be made here of two kinds of gold sands: 1) Channel auriferous sands, not deep, as, for instance, those along Kazakovka or Kluchevaya; and 2) the so-called "bench" auriferous sands, lying 70-140 feet deep from the surface.

Those sands which had been investigated in full have already been worked out; of the "bench" sands a part only had been worked out, the average content of gold varying from \$1.90-\$0.03 to a ton of sand; the thickness of the layer taken being from 8 to 11 feet. According to official data, taken in 1919, the resources of gold remaining in the untouched Kazakovsk "bench" auriferous sand was figured to be 748 lbs. After 1919 no exploitation was made. In reality, the resources of gold, according to data of the experience of former years, should be considered larger and it may be definitely held that the quantity of gold in the untouched parts of the Kazakovsk mine is about 1,120 lbs.

Besides, up to the present moment, there has remained uninvestigated a part of the sand situated in the suburbs of the village Malaya Kazakovka along a distance of about a half mile. It surely contains gold fit for the industry, as on both sides of the village there is being exploited the same mine, with good content of gold.

The resources of gold in the part of the mine situated beyond the village Malaya Kazakovka, and within its suburbs are held to be 1791 lbs.

In all, the resources of gold along the Kazakovsk hollow should be held to be 2907 lbs., as is seen from the enclosed table.

The resources of gold are not confined to the above figures. The main part of the Yushkovsk mine had not been worked out. The mine "Sukhoy," along the Kolobovsk, contains, in its investigated part only, more than 360 lbs. of gold.

A mine along the Grasnukhinsk "bench," near the village Lieskovo, is known to contain gold, but investigations have not been completed yet.

Besides the places mentioned above, there are a number of other sands in the region of the Kazakovsk mines, where gold

has been located. As they have been very little investigated, it is premature to speak about the resources of gold there.

As regards the equipment of the Kazakovsk mine, it had been well equipped from the technical point of view. There is a central electric station installed in the valley of the river Unda, at the mouth of the river Kazakovka. The electric current supplied by a 3 H. P. generator of 190 kilowatts.

Electric current was used for: 1) The delivery of water from the river Unda to the Kazakovskaya "bench" for the washing of sands; 2) for the pumping of water out of working mines; 3) for the mechanical lifting of the sands; 4) for lighting of the mines and all other buildings; 5) for the dredging machine, etc., etc.

The following is the machinery installed at the electric station:

1—"Lantze" locomotive, with tandem-compound, 230 H. P.
2—"Erlikon" works generator.

3—"Otto Schwabe" centrifugal pump, connected with a 160 H. P. motor.

4—A number of centrifugal pumps, cranes, and other auxiliary apparatus.

Novotroitzk Mine

As was already mentioned above, the Novotroitzk mine is situated in the valley of the river Unda, 20 miles beyond the Kazakovsk mines. Work is being carried on along a small part of the territory, along a distance of the valley of 3 miles up to the Novotroitzk Stanitza (cossak village). There are two kinds of mines: 1) The channel mine bounded by the banks of the river Unda, not deep under the surface; 2) the terrace and "bench" mines, which are deep, being 35-60 feet under the surface.

These two mines have been worked; partly, by private owners, and partly by gangs of workmen.

The Novotroitzk mines have often proven remarkable for their rich content of gold. The content of gold in the sands has, after washing, varied from \$0.60 to \$2.25 per ton of ore; sometimes there was as much as \$4.50-\$6.00, with the thickness of the gold-containing layer from 5-9 feet.

In most cases, the conditions of exploitation of these sands are easy.

The area of soil permanently frozen is not considerable, so that it is not a matter of great importance in super-terraneous works and cannot cause a decrease in the productiveness of the works, nor it cannot delay the washing of sands in the early spring or late autumn.

So far the exploitation of gold has been carried on by manual labor; no improvements have been introduced; the character of the mine is such as would allow a substitution of mechanical works for manual labor. Only mechanical methods which would decrease to a minimum the complicated gold-mining business and also decrease the number of workers, might allow the exploitation to great advantage not only of the principal mine, but also of the poorer parts of the mine as well. With regard to the resources of gold at the Novotroitzk mines, there are official figures of gold only in those areas which have been investigated in great detail. In 1919, after which no regular work was done, the quantity of gold in the areas of the Nikitinsk and Undinsk deposits was held to be 867 lbs.

Besides, in the valley of the river Unda, there is situated a mine which had not yet been touched by a dredging machine. According to official data, the quantity of gold in that mine is held to be 2,087 lbs.

In reality, the said areas on the gross washing will prove considerably richer. From the practice of former years, the quantity of gold derived had always been nearly two times as much as the data derived from investigations, and the areas themselves turned out to be much larger than shown on the maps drawn by the investigators.

The variance between the data of the investigators and the gross washing at the mines of the Department of the Imperial Crown Lands is accountable for by a number of causes; the main causes being: 1) The unfaithful managers of the mines showed the gold in the Investigation Ledgers in lesser quantities purposely, so that on washing the gold, a part of it could be retained by them; 2) some managers, who were more honest than those mentioned, were making wrong entries, because they were planning to get a premium for the gold washed above the rate.

In view of the above, the actual resources of gold in the Nikitinsk and Udinsk sands of the areas which had been inves-

tigated into, in detail, should be taken to be 1,530 lbs., corresponding to the data of gross washing of former years; while the resources of gold in the place not touched by the dredging machine should be taken to be 3,750 lbs., as is shown in the enclosed table.

Thus, the resources of gold, in the areas which had been investigated in detail, should be held to total 5,280 lbs.

The resources of gold at the Novotroitzk mines do not constitute the total gold reserve; the data of investigations being very meagre, we are taking, for the sake of precaution, only the resources of gold which have been listed. For instance, there is along a slope a large area containing gold which had not been exhausted; then, a rich sand area, though deep, is situated along a distance from the Nikitinsk cut, apparently under the main road; the presence of a large flow of water has delayed the subterraneous works; finally, there is a series of small and single untouched mines scattered all along the mining area which contains much gold. Summing up the above, the conclusion may be drawn, that the figures of the reserve of gold are to be increased by not less than 3,600 lbs. To this must be added that the absence of detailed investigations in areas opposite and beyond the Novotroitzk "stanitza" do not allow us to arrive at anything regarding the gold resources in the area along the river Unda, beyond investigated places, but, of course, no statement can be made that a large extension of the productive area is impossible. A brief investigation and the fact that illegal work was done in two places support the supposition that there are new abundant gold-bearing areas in the valley of the river Unda.

In connection with the resources of gold, it is necessary to mention the dredging operations, and the decision of the Department of Imperial Crown Lands, in 1916, to install a dredge in the Novotroitzk mine. The dredging machine was ordered from the American firm "Bucyrus," and, according to agreement, the machine was to be ready in January of 1918, and was to be delivered to the mines in the summer of 1918. A partial payment for the dredging machine had been made in due time: according to information received, the machine was ready in time stipulated, and was forwarded to Seattle for loading aboard a ship. However, due to the revolution in October, 1917, and

the breaking off of diplomatic relations with America, shipment was postponed for an indefinite period.

There is no doubt that dredging operations could be developed to a large extent, there being data regarding the existence in the Undinsk valley, from Kazakovsk mines to the Novotroitzk mines, of an auriferous mine which is 20 miles long; it is possible that the mine does not contain gold all along, but it is beyond doubt that separate parts of the mine contain industrial gold. On the other hand, there are a number of favorable conditions which render possible the successful application of dredging machines in the gold industry.

Resources of Gold

In the Kazakovsk gold mine in 1919, calculated on the basis of the gross production of gold in previous years:

Districts	Area in square feet	Thickness of sands in feet	Quantity of sand cu. feet	Content of gold per ton	Approximate Quantity of gold lbs.
Kazakovsk-Elan					
Area A	295,470	8.4	2,481,948	\$1.90	848
" E	93,443	8.4	784,921	1.90	268
Total			3,266,869		1,116
Area D	41,895	7.7	322,592	1.50	92
" a	614,950	7.7	4,625,115	2.00	1,699
Total			4,947,707		1,791
Grand Total			8,214,576		2,907

Resources of Gold

In the Novotroitzk gold mines in 1919, calculated on the basis of the gross production of gold in previous years:

Districts	Area in square feet	Thickness of turf	Thickness of sands in feet	Quantity of sands in cu. feet	Content of gold per ton	Quantity of gold in lbs.
I.—Nikitinsk						
Area 1	272,930	44.1	5.25	1,432,711	\$0.90	244
" 2	304,192	40.6	5.71	1,767,479	1.00	327
" 3	101,038	15.61	5.71	586,873	1.00	110
Total				3,787,063		681
II.—Nizhne-Udinsk (Junction No. 5)						
Area a	72,840	31.36	11.27	195,510	1.80	65
" b	59,290	30.59	4.41	262,738	1.80	87
(Junction No. 3)						
Area c	400,575	17.15	3.5	1,401,841	1.00	260
" d	16,660	17.15	3.5	58,310	1.00	11
" e	89,425	17.15	3.5	313,159	1.00	58
" f	37,926	17.15	3.5	133,741	1.00	25
" g	51,076	17.15	3.5	175,616	1.00	33
" h	216,825	19.53	3.5	758,716	1.00	141
" i	405,671	12.11	3.5	937,076	1.00	173
Total				4,276,707		853
Grand Total				8,063,770		1,534
III.—On river Unda						
Area a	7,840,000	14.	35.	1,372,000,000		3,750

2. The Karyisk Group of Gold Mines.

The group of Karyisk gold mines is situated along the rivers Kara, Lujanka, Kularka, and Bagal, which discharge themselves, from the right side, into Shilka.

The sands along Kara have been especially rich. The greater part of the sands of this region have been exhausted; there remains un-exhausted the sand in the lower part of the river Kara, where gold was not known of for a long time on account of the difficulty in making cuts in the thick sands; then there remain unexhausted two other sands: 1) That in the lower part of the river Kularka, and 2) that in the right bank of the river Kara.

Nijne Karyisk, or the So-called Nije-Grebnia Mine.

In the lower Karyisk sand, "Nije-Grebnia," the resources of

gold, according to the data of the Nerchinsk District, total 1,879 lbs. But this was compiled a long time ago, and the figures were based upon the consideration that the exploitation of the sand would be done by manual labor. However, after a detailed investigation, it became clear that the quantity of gold in the sand must be taken to be not less than 4,284 lbs., in the event of the application of mechanical methods.

The use of mechanical devices, most likely of dredging machines, is required in order to insure a steady and regular exploitation of the deposits and the extraction of the total of the resources of gold therein. Some regions of the area will require a more detailed investigation; there is a likelihood that the sand extends to the Karyisk village and reaches the river Shilka. In the latter case, the resources of gold would be increased even more.

"Nijne-Kularskaya" Mine

The "Nijne-Kularskaya" gold-containing area, according to the data of the Nerchinsk district, contains gold totalling 927 lbs. Only 2 miles of the area have been investigated, but there is no doubt that the said Kularsk mine will largely extend down along the valley. It is only necessary to make detailed investigation which would definitely show an increase, as compared with data compiled of the resources of gold in this deposit.

Gorbichan-Jeltugin District of Gold Mines

This district consists of the basins of the river Gorbitsa and Jeltuga, which discharge themselves into the river Shilka, the river heads of the rivers Gorbitsa and Jeltuga being at the Xenievsk mountain. This district is remarkable for great resources of gold and high gold-content of the sands. The richer regions of the District which were fit for manual labor have been exhausted; there still remain large gold-containing regions which are not fit for manual labor, but fully fit for mechanical exploitation. Of these are: the regions along the middle and lower part of the river Jeltuga, the regions along the river Davenda and the river Gorbitsa. There is no possibility of giving the exact figure of the resources of gold in these regions referred to because of their being so very little investigated.

Besides the investigated regions of the District, the eastern part of the region of the river Burgusens' basin and the western region along the left tributaries of the river Chernaya, the river Itakenda and a large cavity Uldugitch are expected to have large gold-bearing areas.

It must be remarked that the very large quantity of the old flint stones contain even until the present time considerable quantities of gold which may be extracted profitably by mechanical methods.

Amazar District

This is a large district (over 18,000 square miles), covering the whole of the basin of the river Amazara with its tributaries.

In the whole of the Transbaikal Province, this district is the one that has been least investigated. This is explained by the fact that prior to the construction of the Amur railway, this marshy forest region had been inaccessible. The construction of the Amur railway has greatly contributed to the development of this district; a number of very rich gold-bearing areas have been discovered; viz. in the upper part of the Amazar's basin, along the small Amazar and its left tributaries, Amunna, Kliuchik, Vasilievka and Amazarkan; and the other areas along Amazar—Big Mogoch, etc.

As investigations of the Amazar District are being made, new gold-containing areas are being discovered; in this connection, as already stated above, the investigations at all times were conducted primitively and on a small scale.

In 1916 there was discovered a rich gold-bearing area in the riverhead of the river Big Mogoch and a drawing of a continuous area, an area which contains gold throughout its entire length, has been made. This area contained over 1,800 lbs. of gold. The subsequent revolution and the general turmoil have proved an obstacle to the introduction of regular works there. At present the richer part of this area had been deprived of gold by "illegal" works known as pillaging. However, the greater part of the area, where gold content is \$0.20-\$0.30 per ton of sand and turf, remains untouched, and can be advantageously worked by proper means, more especially, by hydraulic works.

Investigations have been made in the area bordering on

the above mentioned gold-containing area, in the upper part of the river Big Chichatky, at the other side of the mountain range. The investigations have given good results, and it was intended to make detailed investigations but, in this instance also, civil war interfered.

Further to the east, the Amazar district remains almost entirely un-investigated, with the exception of the mine Solonechensk, along the river Solonechnaya, the right tributary of the river Big Chichatky.

Brief investigations which were undertaken by some individuals met with success and some places proved to contain gold; however, on account of the war and lack of labor and, subsequently due to internal troubles, in no place could the investigations be made properly. Special attention should be paid to the river Djalindjak and Desa, the right tributaries of the river Big Chichatky and the left tributary of the river Amazar.

In 1918, Mr. Nerre, an Engineer, had applied for a concession in this district, but was refused.

The auriferous areas mentioned above may be relied upon to contain gold in large quantities and as fit for the introduction of production on a large scale. As regards the areas where the introductions of production on a large scale is possible, in particular, mechanical works, mention of numerous places could be made, among these of particular interest are the gold-containing areas along the Black Urium (Cherni Urium) and the river Baldja.

DEPOSITS OF GOLD ORE

Of the deposits of gold ore in the Baikal region, special attention should be paid to the Darasun deposit, 43 miles to the northwest of the railway station Shilka, of the Transbaikal Railway. This deposit consists of a whole system of veins intersecting a diorite massive soil. There had been discovered 6 main veins.

The average thickness of veins is 2 feet. The vein represents quartz which contains sulphuric, arsenic and copper pyrite. The gold-content of the ores varies greatly, from \$1.50 to \$140.00 in one ton of ore gold; the average gold-content of the ores, according to experiments of Mr. Andreev, Engineer, was \$12.00 to a ton of ore.

"Visible resources" of gold cannot be shown definitely, for the lease holders of the mine have often been doing work by very unproductive and exhaustive methods, and no care was taken towards preparing regular massive lots.

According to data available, the probable figure of the gold reserve of this deposit should be estimated at 18,000 lbs.

Of other ore-deposits in the Transbaikal Province, special attention should be paid to: 1) Ilyinsk; 2) Kazakovsk, and others.

In general, it must be admitted that the exploitation of deposits of gold-ore in the Baikal region is still in its infant stage.

II.

GOLD BEARING REGION OF THE NERCHINSK MINING DISTRICT

1—The Amazar Region is situated in the basin of the upper part of the river Amazar, the left tributary of the river Amur. The region occupies the north-eastern part of the Transbaikal Province. The region is intersected by the Amur railway along a distance of 35 miles. It consists of granites and gneisses, the diorites and horneblende gneisses being present in smaller quantities. In the direction from south to north, the region is intersected by an elevated soil consisting of hard ores, where quartzites and very hard conglomerates are to be found. Auriferous sand has been seen in many places. The main auriferous groups are: 1) Upper-Amazar group, lying along the small Amazar and its tributary Ukonnik, and along the large Amazar and its left tributaries Amunnaya, Kliuchik, Vassiliefka and Amazarkan; 2) Kadachin; 3) Vilukchin, situated in the basin of Big Hogochi; 4) Horogochin group; 5) Dodor group; 6) Djelindin group; 7) Shurgin group, situated in the middle part of the river Amazar. Along the Big Chichatka, the left tributary of Amazar, are lying groups which also belong to the Amazar region; 8) Kuli-Solonech group; 9) The river Dess group; 10) The river Djapidjak group; and lastly, in the lower part of the river Amazar are lying groups: 11) Nijne-Kavitkin, and 12) the river Utens group.

In this district the resources of gold in 1917 were as fol-

lows: along the river Amazar about 18 lbs. with average gold-content \$0.71; along the river Big Amazar about 90 lbs. with average gold content \$0.42—0.73; along the river Horogoch about 432 lbs., with average gold content \$1.03—1.78; along the river Big Hogoch about 234 lbs., with average gold content \$1.10; along the stream Priamoi, the left tributary of the river Big Mogochi, about 612 lbs., with average gold content \$0.82—1.36; along the river Tangarakt, the right tributary of the Chichatka, about 252 lbs., with average gold content of \$1.94.

2—**Holodjikan District**—consists of two groups of auriferous rivers Holodjikan and Daptukan, which discharge themselves into the river Shilka (at her right side, a little above its conflux with the river Argun).

3—**Gorbachen-Jeltugin District**—is situated along the left tributaries of the river Shilka, which tributaries discharge themselves into the Shilka below the mouth of the river Chernaya. The northern border of this district is near the Amur railway. The granites and sionites are in the majority and followed by porphyrites, diorites and fazites. In the valley of the river Shilka are largely seen lime-stones which are not found in the Amazar district. The main gold-bearing groups are the following: 1) Verkhne-Jeltugin group; 2) Gorbichan group; 3) Ust-Jeltugin group; 4) Gorbichan-Xeniev group; 5) Kliuchi-Bugusein group, and 6) Shaikin group.

At the left bank of the river Jeltuga there have been discovered about 162 lbs. of gold, with the average content of \$0.67.

4—**Cherny-Urium District** is situated in the summit of the Cherny Urium, which is the left summit of the river Chernaya, as well as along the right tributary of the river Itaka. In this place here are, mainly, granites, sionites, liorites, and felsites, with lime-stones being almost entirely absent.

This district consists of three groups: 1) the group of the summit of the Cherny Urium; 2) the group of Itaka; 3) the group Uriumo-Xeniev.

In 1917 the resources of gold in this district were as follows: along the Cherny Urium and its tributaries Beresovka, Sobachkina and stream Gorky, Amudjikan—about 4968 lbs.

5—**Archikov District**—is situated in the upper part of the

basin of the river Biely Urium, the right summit of the river Chernaya. The whole valley of the river Biely Urium is crossed by the Amur Railway.

6—**Karyisk and Ust--Chernin District**—is situated on the right bank of the river Shilka, just above the place where the river Chernaya discharges itself into the river Schilka. The auriferous sands are, mainly, in the valleys of the left tributaries of the river Schilka, and only a part of the number of such sands are found along the right tributaries of the river Chernaya. In the northern part of the district are found granites, granite-porphyrates, diorites, prophyrates, phylsites, and gneisses. In the part of the district which is adjacent to the valley of the river Schilka, these ores of minerals are absent, schists, conglomerates, and limestones being found instead.

The district is divided into the following groups: 1) the group of right tributaries of the rivers Chernaya, Burukaochi and Ilikan; 2) the group of Big and Small Kularki, with their tributaries Petrova and Sharabanikha; 3) the group Lunjanka-Bogacha, and 4) the group of the river Kara with Ivanovka, Dmitrievka and Kliuchik. The sands along the river Kara were particularly remarkable for containing gold.

Gold resources along the rivers Ivanovka, Lunjanka and Big Kularki are held to be about 1332 lbs., with average content from \$0.45 to \$0.90; the resources of gold along the river Kara are held to be about 2412 lbs. Besides, along Kara and Big Kularki are set aside large plots which are fit for mechanical exploitation, and contain about 7812 lbs. of gold, with average gold-content from \$0.33 to 0.54.

7—**The District of Left Tributaries of the river Shilka** (the tributaries discharging themselves into the river Schilka above the mouth of the river Chachy. This district is also not far from the Stretensk railway line. The main auriferous rivers of the district are Kochertay and Kurliche.

The soil of the district consists, mainly, of granites, granite porphyries, gneisses, mica schists, lime-stones, conglomerates, etc., etc. In the hill Krestovaya which is situated on the right bank of the river Kurliche, near its mouth, an initial discovery of gold in the quartzite veins was made in 1877.

8—**Urulgin District**—is situated along the right bank of

the river Schilka, below the mouth of the river Onon. The soil of the district consists of granites, etc.

The district is divided into two groups: 1) group of the river Peshkova, with its tributaries: Chinkirihama, Berdanikha, and Kiburushka, and 2) the group of the river Aprelkova, with its small tributaries.

In the auriferous sands of the rivers Urulga, Aprelkove, Bravaya, Peshkova, and Schilka, the resources of gold were held to be about 936 lbs., with the average content from \$0.75 to \$1.15.

9—**Undin District** is situated along the middle and lower part of the right slope of the valley of the river Unda, which is a right tributary of the river Onon. It occupies the south slope of the valley of the river Unda, which is a right tributary of the river Onon. It occupies the south slope of the Borshovochini mountain range, where the central part consists of granites and biotite, gneisses, while along the borders quartzites, schists, lime-stones, etc., are found.

The district is divided into three groups: 1) the group of the Youshkov camp; 2) to the west is situated the group of the Kazakovsk mines, where the river Kliuchevaya, its extension Sukhaya, Pad, and the valley of the river Kazakova contain auriferous sands. In view of the gold lying very deep, subterranean works are being conducted; 3) 20 miles off is situated the Novotroitzk group, where works of extraction of gold are conducted in the lake-like extensions of the river Unda, as also along the right bank of the river Unda.

The resources of gold are held to be: 1) at the Kazakovsk "bench" with mine works being conducted—about 1476 lbs., with average gold-content \$1.41; 2) at the Novotroitzk mines, with open and mine works being conducted, about 1170 lbs., with average gold content from \$0.72-1.13, while if mechanical methods were applied, about 2250 lbs. with compound content in turf and sands about \$0.09.

10—**Shachtamin District**—is situated between the basins of the rivers Unda and Gasimur. It consists of granites, granite sionites, diorites, porphyries, and porphyrites; in the central part of the district these ores are absent—sandstones, schists and limestones being found instead. The district is

divided into the following groups: 1) the group of the river Schachtama; 2) the group of the river Ushkanka; 3) the group of the river Galamnaya; 4) the group of the river Doginja; 5) the group of the river Kulinda.

11—**Kultumin District**—is situated in the middle part of the valley of the river Gasimura and along the rivers Kultuma, Kultumushka, Eromay, Kuley, Boshogoch, Gugda and Balney. The central part of the mountain range consists of granites and gneisses, which are substituted by porphyries, schists, and sandstones. This district at the same time contains silver-lead. The local auriferous sands, along the rivers Gugda and Boshogoch, are remarkable for their containing in the schlichs of grains of minerals, torianite, together with leadstone and carbonic bismuth.

12—**Tainin District**—is situated between the heads of the rivers Uriumkan, Urov, Gasimir and its left tributary Zola. The hills' soil consists of granites, granite-sionite, diorite, whch on the slopes are substituted by schists, sandstones, and grauvak ores.

The auriferous sands of this district are situated along the right tributaries of Gasiumr-Priamaya Taina with its left tributary Bistraya, and, in turn, its tributary Tokovaya; there are sands along the cavity Sherokaga, along the left tributary Uriumkanskaya Taina and the Ildikan Gasimursky.

13—**Krasnoyarsk District**— is situated along the right tributaries of the river Gasimir (in the cavities Suhaya and Borovskaya) which tributaries discharge themselves in the river Gasimir below the mouth of Zola.

14—**Olenuisk District**—is situated along the Akatuy, the left tributary of the river Gasimir, near the Akatuev silver-lead deposit.

15. **Uriumkan District**—is situated at the southeastern slope of the mountain range which divides the basins of the rivers Burdiukan and Uriumkan, along the tributaries of the latter Bielokoguch, Lugich, and Lugikichan, and also along the valley Uriumkan (near the mouth). The area is little investigated both from the geological point of view and as far as gold bearing is concerned.

16—**Budiumkan District**—is situated along the small river Kuchuga.

17—Kudein District—is situated on the right slope of the mountain range extending along the left side of Urova. A tributary Kudeya discharges itself into Urova (in the lower part of the latter, from its left side). The heads of Kudeya contain gold. Besides the river Kudeya, its right-side tributaries are also said to contain gold. Further along several rivers which discharge themselves into the river Argun (from the latter's left side) are held to contain gold.

18—Gidarin District—is situated on both slopes of the mountain range which divides the two heads of the river Urov, one of the two heads being called Gidary.

The rivers Big and Small Borovushka, Big and Small Bulatka, Jerdovka and Jagutina are held to contain gold.

19—Nijne-Borsinsk District—is divided into several groups. A part of the District is situated along the tributaries of Big Zerentuy (Dve Shamanki); another part of the district—along the left tributaries of the Nijniaya Borzia (rivers Korjiha, Lopatikha, Brekachanka), a further part—along the right tributaries of Nijniaya Borzia (Kozlika and Shirokaya). The channel of the Middle Borzia, its left tributaries Munia and Solkoken, as also the right tributaries Zverinetz and Bogomolovka, are held to contain gold. To the south of the main strip of the auriferous land are found gold mines situated along the Serni Ildikan, the heads of the Chashinsky Ildikan—Mirsky and Kasenny Ildikan and the Chashinsky Ildikan, below the two above-mentioned heads. The gold containing parts of land are situated among the outlets of massive-crystallic and schist ores surrounded by outlets of vulcanites.

This latter fact prompts to make a deduction of gold-sands being buried under volcanic ores. All the auriferous sands of this region are situated in the area of silver-lead deposits. Because of the fact that the sand is adjacent to a quicksilver mine, in its schlichis is often found a great quantity of cinnabar.

Along a number of rivers of this district, as well as in the adjacent districts (Middle Borzia, Lopatina, Serni Ildikan, Kulie, Small Borovaya, Urova, Dikaya, Lugie, Cheremukhova, Mirsk Ildikan, Shirokaya), gold resources have been discovered for both super-terraneous and sub-terraneous works—about 2178 lbs. The average gold content varies from \$0.40 to 1.35.

20—**Baldjin District**—is situated in the south-western part of the ex-Nerchinsk District near the mountain range which separates the heads of Chikoy and the basins of the river Onon. The mouths of these rivers, Ashingi, Baldji and Kirkun, where the heads are situated at this spot summit level, extend into Mongolia. The mountain range consists of granites, which, in some places, are replaced by lime-schists, conglomerates intersected by numerous veins of quartz.

In this district are known numerous gold-containing rivers which are worked, partly by the government and partly by private owners.

III.

FUNDAMENTAL GOLD DEPOSITS IN THE ZABAIKAL PROVINCE

1. Gold is found along the stream of Khorogochi, the left tributary of the river Amazara, entering about three or four versts below the mouth of the river Mogochi. There are 7 quartz veins of auriferous nature; has been little investigated and not mined. The proportion of gold was up to \$4.50.

2. Along the head-waters of the stream Amumnnaya, the left tributary of the river Amazara, a sulphur ore vein containing gold.

3. At the head-waters of the river Maly Urium, on a mountain peak 200 meters above the level of the valley of the river. Auriferous quartzite. Has been little investigated; average contents of gold from \$1.50 to \$3.00 per ton.

4. Along the stream Kliucha, the right tributary of the river Bogodzhio, which flows from the left side, into the river Zheltuga—the left tributary of the river Shilka. A thick vein of from 12 to 30 pounds; the average proportion of gold is \$7.15. Has been mined for several years, but about eight years ago mining was stopped.

5. Along the river Kara, the Dmitrev deposit, situated on the watershed between the source of the Kara river and the headwaters of the Ivanovka stream, its right tributary. Many

veins of auriferous quartz-turmaline rock of varying thickness, with an average proportion of gold of about \$9.00. The general supply of gold contained in the veins already investigated has been estimated at about 1,440 lbs.; has not been mined.

6. On the embankment, along the Upper Kara, opposite the Amur village, occur thin quartz veins of 1 to 3 m.m. with visible gold.

7. Near the camp on the Verkhnaya Kara, and at a distance of 1½ versts below it, there have been found quartz veins and sands with visible gold. Not investigated.

8. At the mouth of the stream Kurlycha, the left tributary of the river Shilka, opposite the Yepifantsev village, lies the Krestov gold ore deposit, discovered in 1777. In view of the small proportion of gold it contains (\$1.40 per ton), the double process of extracting was abandoned.

9. Along the stream Dilmachek, the left tributary of the River Shilka, there is on the source an open deposit, amidst granite. This, however, was little investigated, and the results of the work are unknown.

10. The Darasun gold deposits are situated along the river Uzur-Malakha, the upper right tributary of the river Darasun, the left tributary of the River Torgo, which flows, from the right into the river Nercha. These are rich deposits, which have been little investigated at various times and stopped in 1918. The average proportion of gold is not less than \$6.00 to \$7.50 per ton, in some places considerably more.

11. On the watershed between the river Naraka, the left tributary of the river Kiya, the tributary of the river Shilka, and the river Denaka, the right tributary of the river Edakuy, which enters, from the right, the river Dulurga, the right tributary of the river Nerch.

12. Along the river Mirsanova, in the Arulgin region, two quartz veins of auriferous character, with a proportion of gold of \$1.50 to \$7.50.

13. At the shaft of the Sluchainyi gold mine, within the Urulga river system, occurs a quartz vein with a gold proportion of \$1.60.

14. At the rapids of the Chenkirikha, which enters, from the right, the Pravaya Peshkova, in the soil of the shaft, there occurs a strongly kaolinic layer with a considerable proportion of gold.

15. The Kasakov gold ore region is situated along the river Kasakov, the right tributary of the river Unda. Numerous quartz veins of auriferous nature, which yield a proportion of gold of \$2.25, \$7.50, \$16.50. The total amount mined amounted to 707 lbs., with an average proportion of gold \$6.00.

16 and 17. To the west of the river Kasakova, at the source of the river Buyanikha, and in the glen of Zamorikha, unsufficiently investigated auriferous veins.

18. On the left bank of the river Unda, at a distance of 1½ versts below the village of Novotroitsky, a quartz vein with a proportion of gold of \$6.00.

19. In the Ust-Baley lot, on the right terrace of the valley of the river Unda, between the village of Novotroitsk and the pond at the Novotroitsk mine, a quartz vein with a proportion of gold of about \$6.00.

20. In the valley of the river Shunduya, the lower left tributary of the lake Unda, occur numerous quartz veins of auriferous nature, in some of which the proportion of gold was about \$15.00.

21. In the Uruliunguy mountain range, in the Chistyakov mine at a depth of 21 meters, occurs a quartz vein with silver-lead glance, having a proportion of gold from \$2.65 to \$34.50.

22. In the same region, in a branch of the Urtuy range, occurs a vein of auriferous quartz.

23. The Kutul auriferous veins are found in the massif situated in the tongue of land between the River Tura and its left tributary Zhimbira, at the source of the Kutul. The average proportion of gold was over \$4.50. The mining of it stopped in 1918.

24. The Ilin deposits are found on the right side of the valley of the river Bezymyanka, at a distance of 1½ versts from its entrance, from the right, into the river Ilia, at 22 versts above

he village of Krasnoyarsky. Near the quartz-porphry veins here occurs a layer of biotite granite ore. Percentage of gold from \$6.00 to \$200.00. These deposits have been mined many times since 1884, but on account of the small proportion of gold, mining has been stopped for the last ten years.

25. The Yevgrafov deposit lies at the source of the river Sredni Khongorok—the left tributary of the river Kira, which flows, from the left, into the river Onon, at about 150 versts above the City of Aksha. A massive quartz vein, with numerous small veins. They have been mined since 1884 up to the present time, with but two interruptions for a short time. The proportion of gold extracted used to be from \$6.00 to \$45.00; at the present time the proportion is from \$6.00 to \$15.00.

26. The Yevdokiev mine lies at the source of the stream Bayan-Zurga, the right tributary of the River Sredni Khongorok. A quartz vein with a proportion of gold from \$6.00 to \$15.00. This deposit has been mined for a short time in the eighties and again in the nineties of the last century.

27. The Khongorok deposits besides the two above named, in the system of the Khongorok rivers, at their source, there are numerous quartz veins of auriferous nature, which are as yet not much explored.

28. Along the river Khamara, the right tributary of the river Tyrina, which, from the right, flows into the river Onon there is a quartz vein of auriferous nature, which, at the end of the last and at the beginning of the present century, was mined for a short time. Mining, however, was stopped long ago.

The Baldzhinsky Auriferous Veins

On the watershed, lying on one side, between the sources of the river Baldzha, the left tributary of the Onon river, the Nizhny and Sredny Baldzhir rivers, and the stream Barun-Salon, which flows into the Pravaya Baldzha, and on the other side, the stream Chineya, the right tributary of the Chikoy river, occur scattered in various places 8 auriferous veins, already investigated, at the surface as well as at a depth of from 21 to 70 feet. The proportion of gold in various veins as assayed was

found to be from \$3.00 to \$12.00, or \$15.00 per ton. These deposits have not been mined.

29. On the mountain ridge, between the tributaries of the Lower Baldzhira—Banny and Perevalny,—at the right slope of the latter.

30. At a distance of half a verst from 29, at the source of the Perevalnaya river, on the watershed between the latter and the Bezymyanka stream, which is a tributary of the Chiney river.

31. On the right slope of the Perevalnaya river and up to the watershed which divides it from the valley of the Sredny Baldzhir river.

32. Between the source of the Banny Klyuch and the Bezymyanka river, along the slope toward the Banny Klyuch.

33. On the crest of the Golts mountain, between the rivers Chiney and Nizhny Baldzhir.

34. On the crest of the mountain ridge lying between the sources of the rivers Perevalnaya and Sredny Baldzhir.

35. On the watershed dividing the Banny and Medvezhy springs, tributaries of the Lower Baldzhir river, and along the slopes inclining towards the valleys of these streams.

36. On the large right slope of the Elizavetsky rivulet the right tributary of the stream Barun-Salon, which flows into the Right Baldzha river.

IV.
LIST OF GOLD BEARING RIVERS IN EASTERN ZABAIKAL
OPEN TO PRIVATE GOLD MINING

Name of River	Location	No. Mines	No. Mines Worked	Average Gold Content per ton
1. Andreevka	Left Tributary River Tura.....	1	1	\$.45
2. Arana	Tributary Molotovoy	1	...	
3. Brown-Hamara	System of the Upper Onon.....	4	2	1.05
4. Baldzha	System of the Upper Onon.....	1	1	.21-.36
5. Bayan-Zurga	Tributary Middle Hongork.....	10	3	.25-.53
6. Barsuchikha	Tributary Upper Baidetui.....	2	2	
7. Baizetui	Left Tributary Ingoda.....	6	1	... to 1.50
8. Baljikan	System Onon	1	1	.30
9. Boitza	Left Tributary Zharcha.....	1	1	.38
10. Buktocha	Left Tributary Nerchugan	1	...	...
11. Bistraya	Left Tributary Taina.....	1	1	.42
12. Gorokhon	Right Tributary Alengui.....	1	1	.27-.30
13. Girmnak	Left Tributary Ingoda.....	2	2	.20
14. Darasun	Left Tributary Troga.....	10	6	.60 to 5.00
15. Depaka	Right Tributary Edakui.....	13	1	.40
16. Dzhermagatay..	Right Tributary of Girmanka.....	3	1	.33
17. Dilmanchik	Left Tributary of Ingoda.....	14	7	.22-.72
18. Dibika	Tributary of Aratza.....	1	1	.22-.40
19. Ernichnaya		1		
20. Zharcha		7	5	.30-.54
21. Zhimbira	System of Tura.....	...	...	...
22. Zagdaka	Tributary of Kienken.....	1	1	.22
23. Zubkona	Right Tributary of Kiuchina.....	1	1	1.00
24. Zurga		1	...	...
25. Zimkina- Edanka	System of Kirmanak.....	...	...	.21
26. Ilia	Left Tributary of Onon.....	4	2	1.10 to 2.25
27. Ildikan	System of Gazimur.....	1	1	.45
28. Kamenka	Left Tributary of Turgin.....	1	...	...
29. Kienken	Tributary of Kiiia.....	2	2	.40
30. Kiiia	Left Tributary of Shilka.....	9	2	.36
31. Kibacha	Right Tributary of Bituy.....	1	1	1.00
32. Kruchina	Left Tributary of Ingoda.....	12	7	.50 to 1.00
33. Kuchinga	Left Tributary of Kruchina.....	2	1	.45
34. Kundulum	System of Onon.....	2	1	.24
35. Kudzhertay	Left Tributary of Grimanka.....	1	1	.50
36. Kurlukta		1	...	.54
37. Kunei	System of Tura.....	6	...	...
38. Lugie	System of Urimkan.....	1	1	.42
39. Mendukuy	Left Tributary of Zharcha.....	1	1	...
40. Molotoi	Right Tributary of Ingoda.....	1	...	...
41. Mordvinekha		1	...	...
42. Naranya	Left Tributary of Edakay.....	1	...	...
43. Naraka	Left Tributary of Kiiia.....	6	3	.33
44. Nerchugan	Left Tributary of Nercha.....	2	...	...
45. Nikichekha	Left Tributary of Ingoda.....	2	...	...
46. Ogikuy	Right Tributary of Uldurga System of Nercha	1	...	...

Name of River	Location	No. Mines	No. Mines Worked	Average Gold Content per ton
47. Pozdnyachikha	Right Tributary of Upper Baydetuy..	1	1	\$.45
48. Popadeykivo				...
Kluich	Right Tributary of Naraka.....	1	...	...
49. Simuchi	Left Tributary of Olenuy.....	4	...	...
50. Sanchagur	Left Tributary of Tura.....	1	...	...
51. Talaia		1	1	...
52. Terenka	Right Tributary of Zharcha.....	9	...	...
53. Topaak	Right Tributary of Zharcha.....	6	3	.27-.40
54. Torga	Right Tributary of Nercha.....	...	...	...
55. Toporkova	Left Tributary of Ingoda.....	4	...	...
56. Tokova	Left Tributary of Bistria, System of Gazimur	1	...	...
57. Tochnikovo ...	Left Tributary of Kutsogar, System of Unda	2	...	...
58. Tura	Right Tributary of Ingoda.....	15	3	.45 to 1.35
59. Khaverga	System of Onon.....	4	1	1.50
60. Khaylastuy	System of Onon.....	1	...	...
61. Khongork	System of Onon.....	18	8	.20 to 1.00 7.00 to 13.50
62. Lower Khongork		1	1	.36
63. Ukeguy	Left Tributary of Shunduya.....	7	...	...
64. Uzur-Malagay	Right Tributary of Darasun.....	11	3	2.10 to 7.75
65. Ushakan.....	Left Tributary of Baytsetuy.....	1	1	.90
66. Ulakan	Tributary of Great Baytsa, which is the Right Tributary of Zenkuy, which is a tributary of the Urulga..	3	...	...
67. Ulegir	Left Tributary of Molotova.....	1	...	...
68. Chernukha	Left Tributary of Ingoda.....	1	...	...
69. Shakhatay	Right Tributary of Unda.....	1	...	.24
70. Shara- Gorokhon	Right Tributary of Tura.....	1	1	.60
71. Shivia	Right Tributary of Tura.....	1	...	...
72. Shikogda	Left Tributary of Ili.....	1	1	.54
73. Shunduy	Right Tributary of Kalaguy, System of Unda	2	...	...
74. Edakuy	Right Tributary of Uldurga, which is the right tributary of Nercha.....	2	2	.30-.55

CHAPTER IV.

THE GOLD MINING INDUSTRY IN THE MARITIME AND PRIAMUR PROVINCES

With regard to the mining conditions, the whole gold-bearing territory is divided sharply into two main parts: the northern part—the system of Amur and Okhotsk sea, and the southern part—the system of small rivers of the South-Ussury district.

The systems of the Amur and Okhotsk Sea contain all the data rendering possible a wide development of the gold industry. The rather small development of the systems practised heretofore is accountable for the fact that the District is remote from other more populated and cultured regions of the Far East and it is little inhabited itself. The absence of roads throughout the territory renders it impassable during the autumn and spring floods. In summer it is also but little passable because of the considerable amount of marshy land. The only convenient ways of communication, (in summer by ships and boats ;in winter over the ice by horses and dogs), are the water-ways: Amur, Amgun, the lakes, Udal, Roel and Chlia, with their navigable water-courses, which connect them with Amur and other numerous navigable small rivers. The gold-containing areas have been discovered in this part of the Maritime Province in the eighties of the preceding century; at first due to the territory being inaccessible, no work was being done.

Since the nineties there began a revival of the gold industry, along the Amgun and its tributaries. Large gold-mining enterprises of Amur (Blagoveshchensk), firms of Elzov and Levashev, and along the rivers Sema and Kerby—the Priamur Co. and Amgun Co. have been established.

In years immediately following their establishment, the annual output of each of the above named enterprises was from 1080-1800 lbs., gold content averaging up to \$3.00 and upwards.

The construction of the Ussury and Transbaikal Railway has given a great impetus to the development of the gold industry. About the lower part of the river Amgun; quite a large number of discoveries of gold along the systems of the Lakes Orel and Chlia, along the systems of the rivers of the Okhotsk coast Kol, Uda, and the system of the lake Udil, is being made; new gold-mining enterprises are being formed, such as Amur-Orel, Okhotsk and a number of minor companies.

Notwithstanding the very difficult conditions, with the absence of roads and the small development of transport, the newly-opened enterprises have yielded during the first decade over 1000 poods of registered gold, with the average content up to \$1.95 to a ton.

With the works being entirely irregular and the expenses allowed for surveying being small, the newly-opened enterprises could not organize themselves on a stable basis; they were aiming, chiefly, at getting hold of the most valuable lots of the discovered districts, and paid no attention to finding and employing improved methods for the exploitation of the poorer lots (below \$0.90 to a ton), which were being neglected. Accordingly, after a rapid increase in the output in the latter part of the nineties, beginning with 1903 there has been a rapid decline in the gold output due to the exhaustion of the richer deposits and the little application of mechanical methods of mining whereby use could be made of the untouched poorer territories.

While in 1899 the total output of gold registered was 6349 lbs., and in 1903—7633 lbs. (the record figure for the output of gold), in the year following the output declined, and in 1910 it amounted to 1796 lbs.

The continual decline in the output, as a result of the "pillaging" methods (the term "pillaging" is used to explain that gold was being extracted by illegitimate means by persons having no right thereto), can be seen from the following table showing the output of gold for five years, viz., 1906-1910:

Year	No. of Mines	Output (lbs.)	No. of Workmen
1906	24	3,334	2,964
1907	31	2,459	3,323
1908	31	3,007	3,562
1909	42	2,314	3,715
1910	46	1,977	5,135

Since 1911 there began a gradual increase in the output of gold, which can be seen from the data given below:

Year	Output of Gold (lbs.)
1911.....	2,736
1912.....	5,076
1913.....	5,699
1914.....	6,429

The increase in the output since 1911 is accountable for by the development of dredge work in the Maritime Province; beginning with that year, there have been brought into employ two dredges by a foreign firm, formerly Okhotsk Co., and one dredge was added to the one used by the Amgun Co., at Nikolaievsk-Alekseevsk mine; in the system of the lake Udlil one dredge was also brought into employ by the Novo-Udlil Co., but the poor construction of the barge caused damage to the dredge, and it had, therefore, been in active service for but a short time.

The work of the dredges is shown in the following table, which was compiled from data taken in 1913:

Enterprises and Dredges	Quantity of gold washed cubic yards	Output lbs.	Quantity of gold per 12.7 cu. yd. of ore \$
Orsk Co. The leaseholders of Okhotsk mines. Californian deep-drawing dredge; drawing capacity $7\frac{1}{2}$ cubic feet	379,197	712	\$ 6.25
Dredge with drawing capacity— $3\frac{1}{2}$ cubic feet	114.656	375	10.60
Amgun Co.			
Dredge No. 1; drawing capacity—3 cu. ft.	115.125	87	3.15
Dredge No. 2; drawing Capacity— $4\frac{1}{2}$ cu. ft.	219.125	197	3.10
Total output by dredges		1,371	

The large dredge of the Orsk Co. of the Californian type, the depth of drawing of which is 7 feet, has steam heat which is serving not only for the heating of the washing appliances, but, chiefly, for the warming up of water flowing into the washing sluices. Because of such construction, the dredge extends the washing period to December, and, on the whole, allows 230 washing days as against 190 washing days of the Amgun Co., which did not introduce such heating in their dredges.

The large dredge of the Orsk Co. is equipped with electric

light, the current being supplied by the Central Station which is ten miles off; the capacity of the station is sufficient to furnish the entire number of mining territories of the system of the Lake Chlia, these territories being suitable for work with dredges.

The small dredge of the Orsk Co. is worked by steam heat, this dredge having been built in this manner: the mechanism for the dredge was taken from an excavator, while the barge and the work of assembling was made in the "taiga" (marshy forest).

It is worth while remembering, that the absence of freezing and the considerable development of the river valleys with large alluvial sediments of soil in the systems of Orel, Chlia and Udil, and also a considerable increase of such sediments of soil in the upper part of the river Amgun (the systems of rivers Semi and Kerbi), will make possible in the future the dredge work, on a large scale, in the Maritime Province (the northern part of it).

Gold Bearing Districts

Of the principal gold-bearing districts mention should be made of the following:

1. The district of the river Semi—left tributary of Amgun.

2. The district of the river Gongren—the right tributary of Kerbi. In particular, attention should be paid to the region situated along its right tributary Sulakitkan which is separated from the river Semi by a short but high summit level.

3. The district of river Kerbi, down the mouth of the river Gongren, with the adjacent tributaries.

The native ore-rocks in these districts are the crystallic schists (phyllites), which come in direct touch with granite massives through the medium of gneisses. So far no deposits of gold ore have been discovered, and, in general, the question has not been considered.

The river valleys—in particular, the main valleys are wide and often contain large alluvial sediments of soil. At present in view of the exhaustion of the rich deposits, the Amgun Co. began introducing dredges. So far they have installed two

dredges at the Nikolaiev-Alexeevsk mine, situated along Kerbi and down the mouth of the river Gongren.

The System of Middle Amgun—Attention should be paid to the region covered by the tributaries of Amgun, near the Udin Storehouse, along the rivers Herpuchi and Hon, where the output of gold during the end of the last century was up to 3600 lbs. The extraction of gold is being made solely from the alluvial sediments of the present day river valleys, although there are a number of indications leading to the belief that there is gold in the "benches". There have been no investigations for the purpose of finding gold there.

The System of the Lower Part of Amgun—Mention should be made of the lakes Orel and Chlia and, in this connection, the region of the river Kol which discharges itself into the Okhotsk Sea. Along the Kolchan, the tributary of the river Kol, at the mines Sretensk and Pokrovsk, the output of gold worked by the Okhotsk Co. in the nineties amount to several thousands of pounds: a foreign firm calling itself the "Orksaya Co.", the present lease-holders, have used two dredges here; the work of the dredges has been described above.

Even approximate data as to the resources of gold in the named districts is not available; gold being plentiful and new deposits of gold being discovered from time to time, there was no inducement towards incurring heavy expenses in connection with making detailed surveys. The activities were, therefore, being confined only to occasional discoveries.

Of late the Udil region situated to the North of the lake Udil has become important. In recent years the major part of gold, viz., not less than 1800 lbs. per year, has been received from this region. The development of the gold industry is handicapped because the roads are bad. This region is especially adaptable to work by dredges, for the gold is evenly distributed in the gold-bearing areas. The latter factor makes it unsuitable for manual labor. In this connection, special attention should be given to the system of rivers Big and Small Bitki, the river Bichi and, further, the river Pochil and lake Djagdach.

In addition to what is set forth above, the world war and the entire disorganization of the economic life and the system

of supply reacted, in the first instance, on the output of gold in such little developed (economically) districts as the northern part of the Maritime Province. Because of the difficulty in supplying the territory of the marshy forests with products and the workmen leaving it, in 1915, the gold output decreased to 50%, it then being 3,240 lbs. (the figures are approximate); in 1916 the output decreased to 50% of the output of 1915, 1,620 lbs. Exact data are not available; as regards the successive years, there is no data at all.

Ways of Communication in the Mining Districts

All the gold mines in the Northern part of the Maritime Province were centered around the town of Nikolaevsk s-Amur. Communication with Nikolaevsk s-Amur was carried on by steamers.

Prior to the revolution, a regular service of merchantmen was maintained in the Amgun river, and steamers ran between Nikolaevsk and the point of Amgun—the residence Kerbi (256 miles). In the winter between Nikolaevsk and Kerbi mail was delivered by horses. The establishment of this service contributed largely to the development of the gold industry due to the close connection of the mine regions with the distributing center of the Province.

A good carriage-road, 56 miles long, connects the residence of Kerbi with the mines along the river Semi, and extends further on along the rivers Gongren and Sulkitkan. The road was built at the expense of the owners of the mines, and its cost, including places of drainage, amounted to from \$600 to \$640 per mile. Further to the north of Kerbi there is no carriage road, and the communication is carried on by means of pack-trains along narrow trails. Therefore the cost of transportation of goods is very much increased (from \$66-\$90 per ton). During the season of bad roads (floods) travelling along the mines' trails is impossible. Notwithstanding these difficult conditions and in spite of there being a high summit of a mountain between the upper parts of the rivers Kerbi and Niman, which summit lies in the adjacent mining district of Burein, there is a trail across the summit. Along this trail cattle and some other goods for the mines are being sent. A scheme was under way that a carriage way be built here for the connection of the Burein mines with the Amgun mines; however, the war and,

subsequently, the revolution, delayed the realization of the project.

The mine region adjacent to the "Udinsky Sklad" has a good carriage road 34 miles long, which is good for use at any season of the year.

The mine-regions of the systems of the lakes Orel, Chlia and Okhotsk coast are based on the mentioned lakes. Communication with Nikolaievsk is conducted by small boats, along the lakes and the water ducts connecting the lakes with Amur. Further, carriage roads connect the residences situated along the lakes with the Okhotsk mine (the road is 10 miles long), and with the Amursk-Oreisk mines (16 miles long); the former road is good, the latter unsatisfactory during the season of floods.

The Udil region which is at present of the greatest importance, and, no doubt, it will be of even greater importance in the future, is connected with the mine residences by water-way from Amur along the Uktinsk water-duct, near the village Bogorodsk and, further, along the lake Udil; the length of the water-way from Amur is 46 miles. From the lake Udil there starts a trail, 40 miles long, across the marsh, and low hills. In summer the passage through the marsh is difficult; therefore the communication with the mines is largely handicapped. A carriage-way was schemed to be built from here to the gold-containing lake Djagdach, and, further, to the Udinsk Store s-Amgun; the war and the revolution have interfered with the construction of the road. This road will run through the very rich, almost untouched gold-bearing district of the lakes Udil and Djagdach.

Gold Industry in the South-Ussury District

The gold industry in the South-Ussury District, in general, has not been large, for the auriferous sands had been exhausted due to the work of the Chinese in former centuries, and as regards new discoveries—none have been made.

In 1919 the output was as follows: Gold-ore, 82 lbs; Gold-sand, 10 lbs.; totalling 92 lbs.

Special mention should be made of the output of gold in the island of Askold. There are three enterprises on the Island: 1) N. N. Lukianov's; 2) K. N. Shakhovsky's; 3) I. I. Kuster's.

The output of gold ore of the first firm was 80 lbs.; while the latter two firms yielded a little more than 2 lbs.

The deposit of gold ore [in the island of Askold consists of a row of quartz veins with visible gold, which is contained in the granites. The average gold-content, on the surface, — up to 0.1 lbs., in veins — up to 0.3 lbs. The quartz veins are not thick—from several inches to 1 foot, but they are numerous, and form a network, the thickness of which is at times several scores of feet. The enterprise has a five stamp mill, equipped with a kerosene motor. The increase of production is prevented because of the absence of water on the island. More attention should be paid to the deposit as the area and the depth of the deposit are large.

APPENDIX

Ordinance dealing with Regulations regarding private Gold-Mining in Districts allotted for such purpose within the Territory of the Far Eastern Republic.

1. The gold bearing fields of the Far Eastern Republic may be exploited on terms of lease obtained from the Government of the Republic by public organizations, private individuals, "artels" of workers, co-operatives, companies, corporations, on the following basis:
2. The lease holder is to begin work on the allotted area within the time specified by the Mining Department within a period of from one to two years, depending upon the nature of the soil and the system of work employed. In case the lessee fails to do so without substantial reasons, the allotted area is restored to the Republic with all the consequences stipulated in art. 10 of these regulations.

Remark: Former owners or lessees of gold mines which are not being worked at the present time are required to begin actual prospecting or working of their mines within the time indicated by the Local Mining Departments upon the basis of the results of special prospecting of said mines.

3. The time limit for the exploitation of leased gold bearing allotments whether of alluvial or auriferous specie shall be determined by the local mining department according to the nature of the strata, and the methods of working employed, but it is not to exceed 36 years. The time limit shall be fixed simultaneously with the issuing to the lessee of the lease or other document authorizing the exploitation of the mines.

4. Beginning with the year 1923 the local mining depart-

ments shall determine an approximate minimum annual output for each mine, basing their calculations on the prospecting results, nature of the soil, methods of working employed, and records of production during former years. Until the year 1923 such minimum output shall be determined by the number of working days on each mine, counting a net output of 8 dolias (1/1150 of a Russian pound) to each working day.

5. For the right to exploit gold bearing fields the leaseholder pays to the Republic:

- a) From gold obtained when piece work is applied—12% from the total quantity of gold mined within the leased area.
- b) Rental per desiatine—from the area of the mine.

6. The rent payment in kind from the total production of gold is established as follows:

- a) From gold obtained when piece work is applied—12%
- b) From gold obtained when labor is paid by day or workers' "artels" are employed—8%.
- c) From placer gold obtained by mechanical methods (dredging, excavation, hydraulics, etc.) or from quartz gold when extracted by amalgamation—5%.
- d) From gold obtained if chemical methods are applied in case of quartz gold—3%.

The charge per desiatine shall be one ruble in gold, to be paid annually. The rent payment specified in this document becomes obligatory from the day of publication of these regulations.

7. The rent in kind shall be paid to the State Bank on the first day of May and the thirty-first day of December of each year, and the rental per desiatine shall be paid on the first day of July of each year. In case of failure on the part of the lease holder to make these payments as specified, he shall be given two months grace in which to make good his arrears. If said payments have not been made upon the expiration of the term of grace, the lease holder forfeits his rights to the allotted area, which then reverts to the Government of the Far Eastern Republic, with all the consequences enumerated in article 10 of these regulations.

8. The working of the gold-bearing fields shall, as a rule,

be conducted upon the wage system basis. The piece work method may be applied temporarily and in exceptional cases, and only in accordance with the regulations promulgated by the local Mining Department.

9. The lease holder shall not transfer his rights to another party without the permission of the Mining Department. In cases of violation of this ruling, the original lessee shall be dispossessed with all the consequences stipulated in article 10 of these regulations.

10. On the termination of the lease, the mines revert to the Government. All buildings and hydro-technical constructions (dikes, dams, rafts, ditches, etc.) become the property of the Republic without any payment for such property. The lessee is given one year in which to remove the balance of the inventory. At the expiration of this period the property, regardless of what it is, found within the allotted area, becomes indisputably the property of the Republic without remuneration for same. Inventory, buildings, equipments, which eventually pass into the possession of the Government shall not, during the term of the lease, be sold, removed, or transferred by the lease holder without the permission of the Mining Department.

11. In case the lease is discontinued prior to its expiration through the fault of the lessee, the mines with all buildings and equipments pass into the possession of the Republic, and shall be returned to the lessee in accordance with article 10.

12. The lease holder is permitted to purchase gold from his workers but not from the workers of other mines. Such purchases shall be entered in the miners' respective pay books. The violation of this latter shall be regarded as deliberate concealment of gold by the lease holder.

13. The lease holder shall be allowed to avail himself, free of charge, for the needs of the enterprise but not for sale, of such building minerals found within the allotted area (as lime, clay, stone, sand, etc.). The exploitation of other useful minerals, however, shall not be permitted without the sanction of the Mining Department and on special conditions.

14. The lease holder enjoys the exclusive right of the use

of the timber found on his allotment and for mining purposes only. He is also entitled to the use of the timber outside his allotment in accordance with the forestry regulations, and at the rate existing at the time in that particular locality.

15. All those engaged in mining, employing complicated mechanical equipments (dredges, hydraulic machines, etc.) enjoy preferential rights of adding to their allotments adjoining unexploited areas for the erection of their equipment or other needs in connection with such mechanical work.

16. In case such adjoining areas, as indicated in article 15, are exploited by manual labor by another lessee, and in case this latter does not wish to amalgamate with the lessee using mechanical methods for the working of both mines by mechanical methods, the Government reserves as its right the power to dispossess the lessee employing manual labor, and to transfer his rights to the lessee employing mechanical methods and thereby extracting a greater quantity of gold, on conditions that mechanical methods shall be applied in the working of both allotments. From the date the allotment is transferred to the new lessee, and irrespective of the time when the mechanical methods will be applied for the working of said allotment, the lessee shall pay to the Government the rent in kind which shall not be less than the amount paid by the previous lessee. The new lessee is credited with such payment in the future working of the new allotment by the mechanical methods. The valuation of the newly transferred mines and its inventory shall be made in accordance with the existing laws and regulations, the amount of such valuation to be refunded in full and immediately by the new lessee to the previous one. The new lessee shall pay the cost of surveying if such be necessary.

17. The lease holder shall be free to exercise his will and judgment as to the means of working of his allotments, the general management of his enterprise, and the internal administration within the limits provided by the existing laws and regulations.

18. The Central Mining Department establishes by special instructions, approved by the Minister of Industry and Government Control, regulations for gold mining enterprises, methods

of bookkeeping, the forms of books for registration of the gold output, the forms and dates when information must be given regarding production of the mines, and the classification of enterprises which must give simple accounting not requiring special bookkeeping knowledge.

19. Beginning with the year 1922 every lease holder shall present to the Mining Department not later than the first day of December of each year a preliminary technical estimate of the production.

20. Lease holders using the prescribed system of bookkeeping shall present to the Mining Department not later than the first day of March of each year a technical report for the gold output for the year just ended.

21. In case the lease holder is found guilty by a Court of deliberately entering in his books for gold registration an amount smaller than the actual output of gold, then, in addition to the legal punishment of those involved in the offense, such offense may also lead to the discontinuation of the lease, with all consequences stipulated in articles 10 and 11 of these regulations.

22. The relations between the lessee and his employees are regulated by the laws of protection of labor.

23. The lessee shall furnish free of charge, lodgings, necessary furniture, fuel and water to representatives of the Mining Department assigned to his mines temporarily or permanently. These representatives shall also be provided for their inspection tours with horses and carts at the prevailing local prices.

24. In case of violation of articles 8, 13, 19, 20 and 23, and also for purchasing gold from workers for other mining allotments, the lessee is to pay a fine in accordance with the degree of such violation, and according to the scale of fines especially fixed by the Ministry of Industry.

25. Investigations and prospecting of gold deposits shall be permitted in virtue of these regulations until the revision of the mining laws.

26. In cases where it is deemed beneficial to the interest

of the Republic the granting of rights for the exploitation of gold deposits on terms different from those stipulated in these regulations may take place by special sanction of the Government of the Far Eastern Republic.

June 30th, 1921.

Affirmed by the Government in accordance with paragraph 43 of the Constitution.

President of the Government,

A. KRASNOSHCHEKOV.

Counter-signed:

Acting Chairman of the Council of Ministers,

PETROV.

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